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25 May 1983

# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 189

**FBIS**

FOREIGN BROADCAST INFORMATION SERVICE

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WORLDWIDE REPORT  
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## CONTENTS

## ASIA

## AUSTRALIA

Union Chief To Seek Ban on U.S. Nuclear-Armed B-52's (THE AGE, 17 Mar 83).....	1
South Australian Government Orders Probe of Radioactive Leak (Paul Robinson; THE SYDNEY MORNING HERALD, 21 Mar 83)...	2
Radioactive Waste Dump Relocation Opposed by Public (THE AUSTRALIAN, 16 Mar 83).....	3
Effect of Radiation From Early Nuclear Test Explosions (BORNEO BULLETIN, 23 Apr 83).....	4
Labor Government Formulating Nuclear, Uranium Policies (Various sources, various dates).....	7
New Mining Options, by Tom Mockridge Call for Mining Ban South Australian Uranium Ban, by Ian Perkin, Peter Blunden Industry Reaction to Ban, by J. N. Pierce 'Blessing for Hawke'	
Briefs Uranium Reserves	12

## LATIN AMERICA

### ARGENTINA

Castro Madero Refutes Charge of Atomic Bomb Test (NOTICIAS ARGENTINAS, 9 May 83).....	13
--	----

### BRAZIL

NUCLEBRAS Subsidiaries' Losses Reach 5.1 Billion Cruzeiros (O ESTADO DE SAO PAULO, 23 Apr 83).....	14
Angra-1 Operation Delay Boosts Cost \$260 Million (O ESTADO DE SAO PAULO, 26 Apr 83).....	17
Briefs Accord With Spain	19

## NEAR EAST/SOUTH ASIA

### INDIA

Nuclear Program Reviewed; Islamic World Urged To Counter Imbalance (Khurshid Ahmad Khan; ISLAMIC DEFENCE REVIEW, No 1, 1983).....	20
Atomic Energy Department Annual Report Released (THE TIMES OF INDIA, 11 Apr 83).....	37
Nuclear Developments Discussed in Lok Sabha (THE HINDU, 14 Apr 83).....	39
Reprocessed Plutonium Intended for Use in Reactors (Prakash Chandra; BUSINESS TIMES, 6 Apr 83).....	40
Briefs Submarine Reactor Go Ahead	41
Soviet Proposal on Testing	41
Tarapur Plant Termed Safe	41

## SUB-SAHARAN AFRICA

### SOUTH AFRICA

Columnist Examines Hellstrom's Defense of Nuclear Power (Bob Molloy; THE CAPE TIMES, 25 Apr 83).....	42
Namaqualand Area Chosen as Nuclear 'Dump' Ground (J. Manuel Correia; THE STAR, 28, 27 Apr 83).....	44
Site Selection Criteria Nuclear Expert Comments	
Briefs	
Uranium Recovery Unlikely	47
Construction Dispute	47

## WEST EUROPE

### FEDERAL REPUBLIC OF GERMANY

Research Minister on Fast Breeder, High-Temperature Reactors (Heinz Riesenhuber Interview; DER SPIEGEL, 2 May 83).....	48
--	----

### SWEDEN

Daily Dissatisfied With Nuclear-Waste Pact With France (Editorial, Olle Alsen; DAGENS NYHETER, 30 Mar 83).....	57
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UNION CHIEF TO SEEK BAN ON U.S. NUCLEAR-ARMED B-52's

Melbourne THE AGE in English 17 Mar 83 p 5

[Text]

ADELAIDE. — The South Australian Government has called for an inquiry into a group's claim that a uranium mine has leaked radioactive water.

The Campaign Against Nuclear Energy claimed yesterday it had received confidential documents outlining "serious technical problems" at the Honeymoon Mine, 75 kilometres north-west of Broken Hill, last year.

The State Government is considering applications for retention and mining leases on the site.

The Honeymoon Mine operated as a pilot plant for three months last year when it tested a new method of mining in Australia, called in-situ leaching. It involves pumping sulphuric acid into underground ore bodies, recovering the solution and removing the ore.

The spokesman for CANE, Mr Mike Innes, said the documents showed that when the solution was pumped down, blockages occurred which "forced radioactive solution to disperse in an uncontrolled fashion."

Mr Innes said the leaks were not big but showed definite problems with the in-situ leaching technique. The radioactive water may have leaked into the Great Artesian Bore.

"The documents we have show without doubt that excursions have occurred and that the cause of them doing so is far from being

resolved, despite the application to mine," Mr Innes said.

"It vindicates what we've said all along — they're making mistakes as they go along and every time they do, the environment suffers and the facts are covered up."

The plant's trial period ended last August and the mine's owners have now applied to the State Government for a full plant licence, using the in-situ leaching technique.

The main partners involved at the Honeymoon Mine are MIM Holdings, a US company, Teton Exploration and AAR.

A spokesman for AAR Limited, the resources arm of CSR, described the incident as a "storm in a tea cup." He said there was no truth in a claim that the mine had been closed due to the problem.

The spokesman, who did not wish to be named, said the mine had been put on a care and maintenance last August after successful completion of the trials.

The Minister for Mines and Energy, Mr Ron Payne, said yesterday that he would obtain a report on CANE'S allegations within the next couple of days.

He said his department had already received information about problems during the plant's trial period, but that these had been rectified.

Mr Payne said he had been made aware of the problem but had been told by the company that it had been resolved before making the application to mine.

SOUTH AUSTRALIAN GOVERNMENT ORDERS PROBE OF RADIOACTIVE LEAK

Sydney THE SYDNEY MORNING HERALD in English 21 Mar 83 p 3

[Article by Paul Robinson]

[Text]

The president of the ACTU, Mr Cliff Dolan, will ask the Federal Government to ban American B-52 bombers with nuclear weapons from landing in Darwin.

Mr Dolan, who will be the key speaker at a rally in Melbourne for nuclear disarmament on 27 March, will also approach the Government to ban US nuclear warships from visiting Australian ports.

He said the new Labor Government should not accept the agreement made by the previous Government not to pry into the surveillance and training missions of the B-52 bombers.

"I don't think the situation should continue to be accepted by the new Government," he said.

Mr Dolan said the Federal Government should also be trying to extract the fullest possible information from the United States

about the purpose and operation of American bases on Australian soil.

He said the trade union movement had accepted the operation of the Omega base on the assurance that such bases were not to be used to guide nuclear warships and submarines.

The Prime Minister, Mr Hawke, said on 7 March that he planned to defer several foreign policy issues agreed to by the Federal ALP Caucus on the renegotiation of agreements covering US bases and the use of Darwin airport by American B-52 bombers.

In March 1981 the then Leader of the Opposition, Mr Hayden, said he would try to renegotiate the agreements.

Mr Hawke's response on 7 March was that "the current situation will remain". Mr Hawke added that he hoped there would be increased consultation about American bases between Australia and the United States.

Mr Dolan addressed a meeting of the Melbourne Rotary Club earlier yesterday and said he believed that employment rather than wage rises would be the main thrust of the national economic summit to be held next month.

Mr Dolan said he believed the trade union movement had "given a great deal of ground" in the prices-and-incomes accord with the ALP.

But he said after the meeting that while the trade unions sought a return to a centralised wage-fixing system and maintenance of real wages, "that is something to be achieved over time".

"The greatest emphasis should be restoring employment," he said.

Mr Dolan said the main thrust of the prices-and-incomes accord was an improvement in employment for Australian workers. This would be emphasised at the national economic summit.

CSO: 5100/7526

# RADIOACTIVE WASTE DUMP RELOCATION OPPOSED BY PUBLIC

Canberra THE AUSTRALIAN in English 16 Mar 83 p 6

[Text]

A PUBLIC outcry over the proposed relocation of a radioactive waste dump in Melbourne has exposed an anomaly in laws controlling the dumping of the hazardous material.

More than 3000 residents of Melbourne's northern suburbs have already signed a petition opposing the proposed dump in their area.

And State Government officials were unable to explain yesterday why the medical and scientific waste was exempt from laws controlling the dumping of other radioactive waste.

Federal and State laws require radioactive waste produced in industry to be returned to its country of origin.

Melbourne's medical and scientific waste has been accumulating in lead-lined drums in a basement with metre-thick walls below public servants' offices in the heart of the city since 1976.

Its existence became public last month when a serious fire broke out in a building adjoining the storage area.

Health department officials described the waste as low-level and not dangerous.

A spokeswoman for the Minister of Health, Mr Roper, said yesterday the waste consisted mainly of used radium needles and contaminated medical equipment.

It was mainly imported from Canada, but she was unable to say why it wasn't sent back there as was required with radioactive industrial waste.

Checks with the department's industrial hygiene division and the Environmental Protection Authority also produced blanks.

The Premier, Mr Cain, revealed plans for the dump's relocation in a letter last week which was meant to allay the fears of the Victorian Public Service Association.

He said in the confidential letter that an alternative site on open land owned by the Department of Agriculture in Westmeadows was one of three sites being considered.

He did not name the others.

Councillors from Broadmeadows, which includes Westmeadows, reacted angrily.

Mr Richard Gozdzik said yesterday he and two other councillors had already collected 2000 signatures on a petition expressing "horror" at the plan.

"We're not only angry about not being consulted, but we are sick of Broadmeadows being treated as one big industrial wasteland," he said.

"We also want to know why there appears to be one set of rules for the Government and another for industry."

CSC: 3100, 7526



# EFFECT OF RADIATION FROM EARLY NUCLEAR TEST EXPLOSIONS

Kuala Belait BORNEO BULLETIN in English 23 Apr 83 pp 22, 23

[Text] *Observer reporters David Leigh and Paul Lashmar report on their investigations into the horrifying results of Britain's nuclear tests in the Australian desert in the 1950s.*

**ALICE SPRINGS.** — Yami Lester is a blind Aboriginal from central Australia. Thirty years ago, the British tested their first primitive atom bombs in the desert where he lives.

He describes what happened, in Alice Springs, a generation later, graphically enough — it was the common talk of his small tribe for long afterwards.

They did not know that the 7am rumble which startled their camp site awake from far to the south-west, was called Operation Totem I. Nor did they know that October 15, 1953, was the birthday of the "independent deterrent," Britain's first droppable nuclear bomb.

What Lester knows is this: "I looked up south and saw this black smoke rolling through the mulga. It just came at us through the trees like a big, black mist. The old people started shouting. 'It's a mamu' (an evil spirit) ... they dug holes in the sand-dune and said 'get in here, you kids.' We got in and it rolled over and around us and went away.

"Everyone was vomiting and had diarrhoea,

and people were laid out everywhere. Next day, people had very sore eyes, red with tears, and I could not open my eyes. I lost my sight in my right eye and could only see a bit with my left eye. I lost my left eyesight in 1957.

"Five days after the black cloud came, the old people started dying ..."

Rumours about the "rolling black mist" started to surface in Australia about three years ago, when white Australian ex-servicemen involved with the tests began to contract cancer, apparently in large numbers.

Since then, patterns of cancer and leukaemia have begun to emerge among British ex-servicemen as well.

Earlier this year, the British Ministry of Defence was forced to announce what they claim is a full-scale health survey among British troops who served at the 10-year series of test explosions. No-one had thought to follow up their health before.

Now, after a three-month investigation which has taken us thousands of miles across Australia, to trace and interview dozens of test survivors, we are able to document for the first time what happened to the Aborigines who were ignorant hosts to Britain's bomb.

It is an unpleasant story:

Aborigine families were doused with radiation from two tests, Totem I and Totem II exploded at Emu Field in 1953. The site was then abandoned.

Remaining Aborigines were "rounded up" into camps hundreds of miles away for the next series of tests, further south at Maralinga, where they suffered great misery and social disintegration.

Between 1957 and 1962, Aborigines then wandered about the unfenced range, unable to read warning signs.

On at least four occasions, families were found there, three times camping in craters.

Hitherto secret Aldermaston documents show the ground was highly radioactive, for years afterwards.

No health records were kept on the Aborigines, who were contaminated with low-level radiation.

It is not surprising that allegations about the "black mist" did not surface at the time.

The Aborigines were scattered, non-English-speaking, remote and few in number. They were also regarded by many Australians as sub-human.

On top of this, white Australia was awestruck by the top-secret military atmosphere of the tests,

at the height of the Cold War.

Australians were lectured by the Anglophile Prime Minister, Sir Robert Menzies, that they must welcome the British programme.

Over and again, they were assured it was totally safe, even to the point of suppressing awkward scientific information.

Only now, in a different climate, is the story being pieced together, with great difficulty.

The new Labour government has agreed to waive time-limits for Alice Springs lawyers who are assembling a lawsuit against the Australian government — recently a writ was served.

Yami Lester's naive story has two striking qualities.

The first is that we found independent corroboration of it, 1600km (1,000 miles) away, in Adelaide and the small town of Port Augusta.

Lester was 10 at the time. But a half-Aborigine woman of 20, Lannie Lennon, was at a nearby settlement on the same day with her young family. She was at Mintubi, 24km (15 miles) from the cattle station at Wallatinna where Lester's family was camped.

In Port Augusta, she told us: "There was a bang: it just rumbled. When the smoke drifted over us, we were walk-

ing about in it. We did not know the danger. It was blackish, and settling all the next day on the trees. The day after, my little kids were sick, they started vomiting.

"Since then, I have got a rash which comes all over me from head to toe. It breaks out in big blisters."

An Australian journalist, Robert Ball, told us how in 1982 he had traced a 74-year-old white woman, a cattle-station owner at Wellbourne Hill, some 64km (40 miles) further north-east.

It was "a big, coiling, cloud-like thing" she told him, like a dust storm. They had shut up the house: "But the trees were coated in this oily dust. They withered and died."

The second remarkable feature of Lester's story is that it is scientifically correct. The symptoms he and others describe are those of acute early radiation poisoning.

His lawyer, Philip Toyne, says: "The descriptions of US civilians who were downwind of the Nevada atom tests are uncannily similar to those of Yami and his family."

It is also documented in official reports that the cloud of fall-out from Totem I did travel steadily north-east for 100 miles right over Lester's encampment.

It was a "dirty" surface fission bomb, which scooped up a great deal of desert dust.

The British Ministry of Defence, which hotly disputes all allegations that anyone suffered from the British tests, says the Aborigines only got a small dose of radiation.

Ministry spokesmen say a plane flew over the area 30 hours afterwards, with sensors to pick up "depositions on the ground."

This plane, with an Australian crew, they say reported only small rea-

dings of 18 millirems of radiation, in the Wallatina area.

They calculated that the wind, at a steady six knots, blew maximum fallout over the aborigines after 14 hours, and gave them a maximum theoretical total dose of one rem. This compares with the maximum safety dose now allowed to the public of 0.5 rem per year.

But this single reading must be treated with scepticism.

The south-west winds in the area, meteorological records show, were moist and unpredictable.

Fall-out clouds often show unpredictable gusts and "hot-spots."

The ministry refuses to reveal crucial data about the size of the bomb, the height of its tower above the ground, and the contents of the classified report on fall-out from the bomb.

Most important of all, there is already hard information that the Australian pilots from the tracker squadron concerned had unreliable instruments and suffered badly from radiation exposure themselves.

Lance Edwards, then a sergeant in a Lincoln bomber, was one of the first people to get an Australian compensation tribunal award, in July 1981.

After he told the tribunal that he had piloted the plane for one and a half hours through the Emu cloud without any protective clothing, and had contracted thyroid cancer six years later, they decided to pay out.

He said: "The plane became so full of radioactive dust that the instruments registered, whether close to the clouds or not."

The planes themselves proved almost impossible to decontaminate.

After 1953, the Emu site was abandoned, on grounds it was "too remote," and the tests moved to Maralinga, nearer the city of Adelaide.

The Aborigines this time were "rounded-up," in the words of Air Vice Marshal Stewart Menaul, who commanded the air task force. They were herded into camps on the south coast of the Nullarbor Plain, at Yalata, quite different from the desert country where they were able to subsist.

They received no compensation and were not allowed to return for 20 years.

"They had no livelihood," says lawyer Toyne, who represents Aborigines in campaigns for land rights. "Some took to drink, some to petrol-sniffing. Others fell sick or died."

Later, in May 1957, the Milpuddie family from Western Australia, were found wandering on the Maralinga range.

They were only noticed because they approached troops, clad in full protective gear, for water.

Kevin Woodlands, the sapper who found them, describes "high" geiger counter readings and repeated showers.

The British government claims that, despite camping overnight on contaminated soil, the family only received a minute "estimated" dose of seven millirem. Australian lawyers are now looking for the survivors to check reports of skin cancers.

Before 1960, another Aboriginal family was found camping in the crater at Marcoo, where a bomb was exploded six feet underground in 1957.

In June 1961, a three-ton lorry set out from Maralinga to rescue yet another Aborigine family from the old Emu craters, where they had been spotted camping.

Thomas O'Donovan, a conscript sapper in the party, went out again in October, when a family were found in a Maralinga crater, camping in the shade. He picked up a third group in November 1961.

Troops were forbidden to write home, according to their service manual, about "contamination of aircraft and equipment ... dose rates received and levels of contamination to which staff or instruments have been subjected."

Another fact kept studiously secret to this day is that one blast, Tadge in October 1957, left pellets of highly radioactive Cobalt-60 scattered around the range.

Cobalt emits powerful gamma rays and has a half-life of 5.3 years.

The pellets were found 12 months after the blast, and some were collected by Australian troops for return to Britain.

In 1964, more were collected when tests ended. They were buried 2.4 metres (8ft) underground in 3.8cm (1.5in) thick lead containers along with a massively radioactive half-kilo of plutonium.

In 1967, in a final attempt to clean up the range, more pellets were collected and buried at Maralinga in lead containers.

This information is contained in an Atomic Weapons Research Establishment report of 1968, which the Ministry of Defence refuses to release on grounds it is classified.

The dangers to which the Australian Aborigines were exposed between 1952 and 1964 came about through ignorance and carelessness.

Scientists knew nothing about low-level radiation hazards, troops had only rudimentary safety instruction, and errors were frequent.

International safety limits in 1953 were set at 15 rem per year — three times higher than today,

for radiation workers.

Some British soldiers were exposed to up to 30 rem on the ministry's own records, which are patchy and inadequate.

Scientists believed there was a safe "threshold" below which radiation was completely safe.

Today no radiation exposure is regarded as safe.

Respected scientists such as Karl Z. Morgan, writing in the Bulletin of Atomic Scientists in 1978, said: "If a worker is exposed to as little as one rem, it would be reasonable to compensate him if he gets cancer."

But catastrophic accidents also regularly occurred during the atomic programme, behind a heavy cloud of secrecy.

The year after Totem I blew over the Aborigines, a much bigger US H bomb, Castle Bravo, doused Marshall Islanders in the Pacific with huge beta doses.

The bomb was unexpectedly big and the wind went wrong.

In Nevada US civilians are still trying to sue over test injuries.

Three years after Britain's weapons-plutonium plant at Windscale caught fire, releasing much radioactivity.

The reactor remains embalmed in concrete to this day, but even the National Radiological Protection Board went so far as to speculate this month that up to 32 people may have subsequently died of delayed cancer.

Yami Lester, and his group of up to 20 Aborigines who may have died in the aftermath of Totem I are probably among the most obscure group of victims of the nuclear arms race.

But they deserve a place in the list. — The OBSERVER.

## LABOR GOVERNMENT FORMULATING NUCLEAR, URANIUM POLICIES

## New Mining Options

Sydney THE SYDNEY MORNING HERALD in English 16 Mar 83 p 26

[Article by Tom Mockridge]

[Text]

The Minister for Resources and Energy, Senator Walsh, indicated yesterday that there were circumstances under which the Labor Government would consider approving the establishment of new uranium mines.

While Senator Walsh's comments appear to soften Labor's anti-uranium stance, he made it clear that approval would depend on solutions being found to the key problems of nuclear waste disposal and nuclear arms proliferation.

In the first, Labor wants to ensure that Australian uranium customers dispose of wastes harmlessly, while in the second, Labor wants assurances that Australian uranium will not be used in nuclear weapons.

Further, as with the previous government, Labor operates a minimum pricing policy for uranium contracts.

Expert advice, Senator Walsh indicated yesterday, was that uranium would be at least six years before market demand strengthened to such a level that contracts could be signed at the minimum price level.

Consequently, the problem of considering whether or not to approve an application for a licence to export uranium would not arise for at least that period.

Senator Walsh was commenting after reports that the Northern Territory Government had stated that Federal Government advice to Aboriginal owners of the proposed \$150 million Koongarra uranium

mine would conflict with Labor's policy of self-determination for Aborigines.

A Northern Territory Government spokesman was also reported as stating that Labor policy would kill off uranium mine development.

The Northern Land Council is negotiating with Denison Australia over development of the mine, and this week won from the Northern Territory Supreme Court approval of its right to negotiate on behalf of the traditional owners.

Federal Government sources said yesterday that the Aborigines had asked for advice on the negotiations, but this had not yet been transmitted to them. The ALP significantly watered down its anti-uranium stance at last year's Federal conference.

Labor's policy, previously committed to closing down existing uranium mining operations, was changed so that contracts already in force could be adhered to.

However, the revised policy did not appear to leave room open for new contracts.

Senator Walsh's comments appear to hinge on the key issues of nuclear proliferation and disposal of wastes. It is these very problems that led the Labor Party into its anti-uranium policy.

He said yesterday that technology had not yet developed to the stage to solve the nuclear wastes problem, and many doubted if it would within the six to eight years before the market had recovered to the stage that the contracts at the minimum approved price could be signed.

## Call for Mining Ban

Perth THE WEST AUSTRALIAN in English 22 Mar 83 p 9

[Text]

SYDNEY: The Australian Conservation Foundation has called on the Federal Government and the WA and SA governments to block uranium mining.

The ACF said that the governments should take immediate action to cancel plans for uranium mines at Honeymoon, Koongarra, Jabiluka and Yeelirrie, as they were clearly defined in ALP policy as "unpermitted."

"If the ALP is true to its policy, there should be no question of allowing these mines to proceed and this should be announced forthwith," ACF spokesman John Coulter said yesterday.

## South Australian Uranium Ban

Canberra THE AUSTRALIAN in English 23 Mar 83 pp 1, 2

[Article by Ian Perkin and Peter Blunden]

[Text]

THE South Australian Government's decision yesterday to veto the Honeymoon and Beverley uranium mines is a big blow to the industry, but does not preclude the possibility of Labor Government approval of other uranium projects.

The federal Minister for Resources and Energy, Senator Walsh, made this clear even as he applauded the decision.

Senator Walsh said advice from his department indicated there was room for no more than one more uranium producer for the next decade.

"It makes much more sense for the South Australians to promote development at Roxby Downs (the big copper, uranium and gold project) than to push ahead with smaller, less suitable mines, such as Honeymoon," he said.

Senator Walsh said stopping Honeymoon was the "only possible responsible decision".

He added: "I expect other governments in Australia to behave in a similarly responsible manner."

The South Australian Minister for Mines and Energy, Mr Payne, justified the decision by the ALP's federal policy on uranium, and environmental and safety grounds.

The environmental and safety grounds related to the in-situ leaching process proposed, which is new to Australia and relatively untested anywhere in the world.

He did not rule out the Honeymoon and Beverley mines going ahead in the future.

In his statement welcoming the South Australian decision, Senator Walsh said economics alone dictated that new uranium mining decisions would be unwise now.

"The economic situation of the uranium industry at present is poor and world prices are low," he said.

"Even the previous government's policy would have required a contract price of around \$40 a pound as a prerequisite for an export licence. There is no chance of such a

contract being written.

"Had Mr Anthony consistently applied his own policy, no exports of uranium from Honeymoon would have been possible under his government. Thus, the announcement by the South Australian government does no more than reassert the policy which has been in operation for some years now."

It became evident last night that the Federal Government played a leading role in bringing about the decision to block the two mines.

Mr Payne admitted talks he held last week with Senator Walsh and the Deputy Prime Minister, Mr Bowen, played an important part in halting the mines.

He denied "claims" by the State Opposition Leader, Mr Olsen, that the decision posed a threat to the \$1600 million Roxby Downs project.

The Honeymoon mine, 75km south-east of Broken Hill, has recoverable reserves of 3384 tonnes. Its joint developers, Mines Administration Pty Ltd (a subsidiary of CSR), Carpenteria Exploration (a subsidiary of MIM) and Teton Exploration drilling Co, planned to use the in-situ direct leaching method of uranium extraction to produce 450 tonnes of yellowcake a year.

The much larger Beverley mine, 140km to the north-west of Honeymoon, was expected to yield 15,800 tonnes of uranium, and sustain up to 500 jobs in the mine and service industries after an expenditure of about \$300 million.

MIM Holdings last night expressed dismay at the decision, claiming there were substantial economic benefits to be gained for South Australia from the development.

A spokesman said: "The joint venturers have maintained close contact with the Government on all aspects of the progress of the project."

"The project has satisfied environmental requirements. The environmental impact statement has been approved. In particular, there has been no contamination of groundwater."

The project manager of Honeymoon, Mr Ross Wecker, said the joint venturers would seek urgent talks with Mr Payne before the end of the week to decide the fate of the mine.

Amid rowdy scenes in the South Australian Parliament,

Mr Olsen called on the developers of both Honeymoon and Beverley to place the mines "on ice" under retention leases promised by Mr Payne.

The manager of the South Australian Chamber of Mines, Mr Tim Drysdale, said the decision would see mineral exploration investment in South Australia fall by about \$38 million ~~the fear~~.

Mr Drysdale said the drop to an investment of about \$13 million on resource exploration activities would cost 500 to 600 jobs.

Mr Olsen moved a motion of no confidence in the State Government immediately the announcement was made, accusing the Premier, Mr Bannon, of "deception" which could cost the State thousands of potential jobs in the mining and service industries and hundreds of millions of dollars in investment.

"This decision was not made on economic grounds, but on blatant political grounds — it is a clear victory for the left wing of the Labor Party," Mr Olsen said.

Mr Bannon said there was room for only one major uranium project in South Australia at present, because the world market for uranium was depressed — and this was Roxby Downs.

He maintained it was unlikely a uranium enrichment plant would be built in Australia in the next 20 years.

The former Liberal State government lobbied heavily for the \$1000 million uranium enrichment plant, being examined by the Uranium Enrichment Group of Australia, to be in South Australia.

UEGA indicated last year that South Australia and Queensland were the two States favored.

Mr Olsen claimed uranium conversion and uranium enrichment plants could generate almost 5000 jobs.

Mr Bannon stressed the Government had provided itself with a "breathing space in which to await developments in nuclear waste disposal and movements in uranium export markets".

The Opposition spokesman on resources and energy, Senator Fred Chaffey, said Australia could ill-afford the Labor Government preventing mining companies from proceeding with uranium development.



## Industry Reaction to Ban

Sydney THE SYDNEY MORNING HERALD in English 23 Mar 83 p 27

[Article by J. N. Pierce]

[Text]

CSR Ltd and MIM Holdings Ltd are likely to review their future involvement in uranium mining following the rejection by the South Australian Government of a mining licence for the Honeymoon uranium deposit.

MIM (with 49 per cent), CSR (25.5 per cent) and the Tetra group of the US (25.5 per cent) had spent about \$10 million on a pilot plant to begin extracting the Honeymoon deposit's 3,400 tonnes of uranium oxide by underground solution mining techniques.

They face the options of scrapping the project or putting it on a care-and-maintenance basis until either a change of government in South Australia or a reversal of the ALP policy to prevent the development of any new uranium mines.

The South Australian Mines and Energy Minister, Mr Payne, confirmed yesterday that the State Government had rejected a mining licence for Honeymoon because it was concerned about unresolved environmental problems, a general downturn in the uranium and nuclear industries, and the leaching methods proposed for the project.

Mr Payne said that development of the Beverley deposit, also in South Australia's Frome embayment, similarly has been blocked.

However, he said the State Government had taken steps to ensure that Honeymoon partners could preserve their interests through a retention lease.

In Canberra, the new Minister for Minerals and Energy, Senator Walsh, described the action as "the only possible responsible decision" and said that he expected other governments in Australia to behave in a similarly responsible manner.

Senator Walsh said advice from his department indicated that there was room for only one further uranium deposit to be developed in the next decade.

"Economics alone dictate that new mining ventures at the present time would be unwise," he said.

It made more sense for South Australia to promote development

at Roxby Downs than to push ahead with smaller mines such as Honeymoon, Senator Walsh said.

But in Brisbane, MIM said that it was "extremely disappointed" at the South Australian Government's decision.

MIM spokesman, Mr J. Collins, said: "The project has satisfied environmental requirements. The environmental impact statement has been approved. In particular, there has been no contamination of groundwater."

The Honeymoon deposit, discovered in 1972 about 75 kilometres west of Broken Hill, is one of a number of small sedimentary deposits formed in South Australia's river channels between 70 million and 90 million years ago.

The proposed in-situ leaching technology, involving pumping of an acid solution through the orebody, was new to Australia but has been widely used in the US.

Claims that the project could contaminate the Great Artesian Basin were refuted by its partners, who said that tests had shown that the groundwater systems of the Honeymoon deposit and the basin were geologically separate.

Neither MIM nor CSR has a heavy commitment in uranium compared with other mineral investments.

MIM's involvement in energy minerals has mainly been directed to coal and although it is the largest partner in Honeymoon, the project is managed by CSR through its AAR Ltd subsidiary.

CSR in the past has stressed that the project would not proceed beyond its experimental stage until it had been confirmed as technically practical, economically feasible and environmentally safe.

Apart from Honeymoon, CSR has interests in the East Kalkaroo and Gould's Dam undeveloped uranium deposits in South Australia, in the Westmoreland deposit in Queensland and — through Delhi — a 53.5 per cent interest in the Lake Way deposit in Western Australia.

It is also a participant in the Uranium Enrichment Group of Australia, set up to undertake a detailed feasibility study or establishing an enrichment plant.

Canberra THE AUSTRALIAN in English 24 Mar 83 p 12

[Text]

THE Hawke Government may well avoid a wave-making decision on uranium exports if a leading uranium broker's pessimistic market forecast proves accurate.

Mr Peter Stork, manager of Oratom Consulting, an associated company of US-based Nuexco Exchange Corp, put the world's yellowcake stockpile at 440 million lb, or five years' forward consumption.

He predicted new uranium mines would open only when the stockpile levels were down. That is, after 1990.

While comforting to Labor politicians stuck with an ambiguous policy, the trade talk after yesterday's minerals conference showed mining companies are sharply divided on the market outlook.

Several uranium company representatives privately rejected the Stork figures.

The Stork perspective is predicated on further reductions in growth in world nuclear generating capacity as utilities cancel or defer planned nuclear power plants.

Uranium production would then continue to outpace consumption. Last year the difference was 46 million lb of yellowcake.

This surplus was being redistributed through a secondary, unstable market at low prices sensitive to even small volumes, he said.

"The market is moving slowly towards a new equilibrium by reducing supply," he said.

"Uranium demand will begin to grow gradually from the end of this decade."

Mr Stork predicted further mine closures in the US, declining production in Central Africa and deferral and cancellation of projects in Australia and Canada.

"Bringing down inventories

to desirable levels may take more than 10 years," he said.

### Deferrals

For Australia, the uranium market consultant expected response after 1990.

Uranium demand would rise first in the US, he said, and American power utilities might be more willing to buy uranium from non-US markets, initially Canada and, after 1990, Australia.

"Existing Australian producers may expand production," he said.

"But projects still in the planning stage will be deferred. Their potential market share can be supplied by existing producers at lower prices.

"New uranium mines will probably materialise only after 1990."

A Bureau of Minerals Resources expert on uranium, Mr Gordon Battey, did nothing to lift the conference gloom with estimates of uranium reserves. These have reached record levels.

The RAR (reasonably assured resources) estimate, at a recovery cost of under \$US30 a lb yellowcake, is 314,000 tonnes. This is a rise of 20,000 tonnes in the past 18 months when Australia produced 6451 tonnes.

That estimate gives Australia 20 per cent of the Western world's reserves.

In the EAR (estimated additional resources) category, recoverable at costs below \$US30 a lb, Australia has 369,000 tonnes, or 25 per cent of the Western world's reserves.

On top of that there is a 75 per cent probability that Australia's speculative resources exceed 2.6 million tonnes and a 50 per cent probability that they exceed 3.9 million tonnes.

CSO: 510C/7525



## AUSTRALIA

### BRIEFS

URANIUM RESERVES--Australia contains almost one quarter of the western world's readily recoverable uranium resources, worth \$34,000 million, according to the Federal Government's Bureau of Mineral Resources. The bureau issued figures yesterday, calculated from exploration data provided by mining companies, which show that Australia has more resources of low-cost recoverable uranium than any other country in the western world, including the United States and South Africa. No estimates were available for the USSR, eastern Europe or China. Australia's reasonably assured resources (RAR)--which can be recovered within given production cost ranges--are 314,000 tonnes, which is 20 per cent of the western world's recoverable uranium. Its estimated additional resources (EAR)--which show the identifiable uranium deposits which are not yet developed--stand at 369,000 tonnes, or 25 per cent of the western world's EAR. This is an increase of 105,000 tonnes over estimates made 18 months ago. This gives Australia a total of 683,000 tonnes of readily recoverable uranium in a total of 3,051,000 tonnes available throughout the western world. [Canberra THE AUSTRALIAN in English 23 Mar 83 p 2]

CSO: 5100/7526

CASTRO MADERO REFUTES CHARGE OF ATOMIC BOMB TEST

PY091453 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1215 GMT 9 May 83

[Excerpts] Buenos Aires, 9 May (NA) -- Vice Admiral Carlos Castro Madero, chairman of the National Atomic Energy Commission [CNEA], has categorically denied that Argentina is planning to test a nuclear bomb before October, and added that this type of rumor coming from London seeks "to break the Latin American internal front."

The CNEA chairman stated: "Argentina has no nuclear program for military purposes underway. On the contrary, all activities in the nuclear field are oriented toward the welfare and health of the Argentines."

In a chat with NOTICIAS ARGENTINAS, Castro Madero stated that the report that Argentina wants to demonstrate that it is still strong in a hypothetical confrontation with Great Britain is absolutely groundless, because one of the bases of the Argentine nuclear policy is to turn the benefits of the nuclear program toward the development of the region."

"If Argentina develops a military nuclear technology it would create a climate of distrust which would lead to the disintegration of Latin America," Castro Madero stated.

He added: "The other problem is that the neighboring countries would not like to remain in a position of inferiority and it would necessarily trigger an arms race which would increase underdevelopment in the continent."

"Moreover -- Castro Madero stated -- a clear fact which supports this policy is that by taking advantage of the dedication of the Embalse nuclear plant in Rio Tercero, a dialogue was developed through which the doors were opened for all Latin American nations."

The CNEA chairman admitted the possibility that the British foreign policy may seek "to break the Latin American internal front with this type of report."

He added: "In fact, similar rumors were heard last week, and now the newspaper THE TIMES has published them."

"An objective may exist to promote disagreement among the Latin American countries that acted so well as a group during the war over the Malvinas Islands," he stated.

Castro Madero recalled the position of the Canadian Government, which has reconfirmed its desire to continue cooperating with the Argentine nuclear plan.

Castro Madero cited as an example the Canadian position as proof that the Argentine nuclear program seeks peaceful ends.

CSO: 5100/2061

# NUCLEBRAS SUBSIDIARIES' LOSSES REACH 5.1 BILLION CRUZEIROS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Apr 83 p 27

[Text] In just four of the seven subsidiaries of the Brazilian Nuclear Corporation (NUCLEBRAS), the accrued losses last year total 5.1 billion cruzeiros, without counting operational expenses of 4.64 billion cruzeiros, difficult to recover, charged to the deferred assets of the Nuclebras Isotopic Enrichment Corporation (NUCLEI), Nuclebras Engineering Corporation (NUCLEN), Nuclebras Heavy Equipment Corporation (NUCLEP) and Nuclebras Mining Auxiliary Corporation (NUCLAM), since those companies are not producing anything and those expenditures can only be amortized from future profits. Those figures were obtained from the financial statements of the companies published in the press, NUCLEBRAS thus fulfilling the provisions of the Law on Corporations for the first time.

The financial statements record loans and financing in foreign currency in the amount of 72 billion cruzeiros taken on the average with a spread of 1.375 percent above LIBOR. Thus, it can be seen from the statements that NUCLEP took loans of 34.7 billion cruzeiros to build its factory in Itaguaí estimated at about \$400 million.

That factory, one of the most modern of its type in the whole world, has an idleness rate of over 80 percent, manufacturing only some heavy components of the Brazilian nuclear program as well as beginning construction work pertaining to the pressure vessel for the Atucha-2 nuclear plant of Argentina. The Itaguaí factory was conceived when the Brazilian nuclear program aspired to build 66 nuclear plants by the year 2000 and will have to maintain idle capacity until that schedule is resumed.

Brazil signed a nuclear agreement with Argentina involving technological and commercial aspects in which it proposes to build equipment for Atucha-2 while Argentina will supply the zircalloy rods that serve to sheath the enriched uranium pellets, thus forming the fuel element that is inserted into the nucleus of the reactor.

NUCLEI, the company whose object it is to build a uranium enrichment demonstration plant in Brazil based on the centrifugal jet system, took 35.2 billion cruzeiros in loans and financing abroad. Last year it proceeded only with construction of the first cascade of the enrichment plant obtaining the clean conditions necessary to begin installation of the equipment.

## More Expenditures

The uranium enrichment process is still the big question mark of the Brazilian nuclear program. According to the original timetable, the demonstration plant was already supposed to be in the process of installation to operate on an industrial scale. However, the jet-nozzle (or centrifugal jet) process that is still being developed technologically, has not demonstrated the slightest operational conditions.

The enrichment plant evolved from an original cost of \$200 million to \$1.5 billion, and even at that cost would not be in an economic condition to enrich the uranium. The centrifugal jet process of German Professor Erwin Becker presents a ratio of energy consumption to the energy that would be generated by the enriched uranium so high that its installation at its present stage is not advisable.

Thus, the demonstration plant kept being postponed year after year waiting for new technological improvements introduced in that process to bring some savings, because at the present stage its installation would be justified only if it were for other than commercial purposes.

NUCLEN signed engineering contracts with national companies amounting to 14 billion cruzeiros, and for the purchase of parts and equipment from national industry in the amount of 80 billion cruzeiros, proceeding with the construction of Angra-2 and the seismic and structural analyses for the Angra-3 plant. It also developed the plans for the Iguape-2 nuclear power stations, beginning the process of installation of the infrastructure at the site. Those projects are being slowed down because President Joao Figueiredo cancelled the contracts signed by the then president of NUCLEBRAS, Paulo Nogueira Batista.

NUCLAM proceeded with its work of prospecting for uranium in the states of Goias, Paraiba and Para. In the areas of interest in Caja and Dianopolis, work was suspended because the results were not very encouraging. The regional office in Recife was closed and the one in Brasilia was retained, the latter with a branch in Campos Belos. Last year 301 million cruzeiros were invested in prospecting. The Parana-Santa Catarina, that had been temporarily suspended, was also considered unfeasible, the funds invested thus far being regarded as a capital loss.

## Storage

The Ministry of Mines and Energy reported yesterday in its weekly news bulletin that 65 percent of the equipment of the Angra-2 nuclear plant is ready and that the heavy equipment, such as the reactor vessel, the pressurizer and the steam generators are stored in Germany. The ministry, however, did not mention the fact that NUCLEBRAS is paying for the storage of that equipment to the company that built it KWU, as the ESTADO has already reported, and that those additional expenses are making the equipment more expensive by about 1 percent per year of its total value, as members of the German company's management revealed in Erlangen recently.

Neither the ministry nor KWU have revealed the value of the equipment that is in Germany due to the fact that, as a result of the 2-year delay in the date scheduled for plant's entrance into operation, it could not be installed in the scheduled time. In addition, NUCLEBRAS does not have the technical conditions to store it in such a way as to prevent corrosion and other types of damage. According to the ministry's note, construction of the superstructure of the Angra-2 reactor building has already reached 40 percent of the total project.

8711

CSO: 5100/2059

# ANGRA-1 OPERATION DELAY BOOSTS COST \$260 MILLION

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 26 Apr 83 p 41

[Text] The 2-year delay in the operation of the Angra-1 nuclear plant because of the problems that have arisen in the emergency diesel generators and in the steam generator will result in an increase of \$260 million in the overall costs of the plant—\$1.3 billion--corresponding to the 10 percent interest per annum on the investment besides the loss of profits stemming from the non-operation of the plant. That information was provided yesterday by Licinio Seabra, president of FURNAS, a subsidiary of the Brazilian Electric Power Stations Corporation (ELETROBRAS), which is responsible for construction of the plant.

The president of FURNAS reported that the loss of \$260 million is Brazil's and not that of the American Westinghouse company which built the plant, as provided in the contract. According to Licinio Seabra, Westinghouse is responsible only for the equipment, which means that the company has to make the necessary repairs with the expenses stemming therefrom being their responsibility. The president of FURNAS could not say what Westinghouse's additional expenses amounted to.

Licinio Seabra revealed also that Angra-1 will be tested by the end of the year at 100 percent of its power of 725 megawatts. The plant has already been tested at 50 percent of its power and at the moment is shut down, according to the president of FURNAS, to be prepared so that the necessary repairs in the steam generator may be made. The emergency diesel generators have already been repaired.

Seabra said that the guarantee he has that the plant will operate safely is the fact that FURNAS technicians are monitoring the repair work made by Westinghouse. In case the plant does not operate at 100 percent power by the end of this year, the loss to Brazil will be even greater than the \$260 million already envisioned because more interest will be paid on the financing granted for the construction of the plant and the latter will continue not to generate any revenue.

If Angra-1 operates in December at 100 percent power, the delay in its operation will have been 6 years compared to the date envisaged during the Medici administration. Four of those years were due to problems of

infrastructure in the site chosen for its construction--Itaorna Beach in Rio de Janeiro--the inexperience of Brazilian technicians with nuclear technology, in addition to other problems of a technical nature. The construction of that plant was begun in 1972, 3 years before the signing of the Brazil-Germany nuclear agreement which envisages the construction of eight nuclear plants; but the Figueiredo administration has committed itself only to begin the construction of four: Angra-2 (already begun), Angra-3, which will be begun this year, and Iguape-1 and Iguape-2, still without any date set for beginning of the projects.

8711

CSO: 5100/2059

BRAZIL

BRIEFS

ACCORD WITH SPAIN--Foreign Minister Saraiva Guerreiro and Spanish Ambassador Miguel de Aldasoro signed a nuclear cooperation agreement today in Brasilia. The agreement provides for the training of human resources and the exchange of information in the nuclear area. The agreement will go into effect as soon as the legal procedures have been completed and it will last for 10 years. [PY130040 Brasilia Domestic Service in Portuguese 2200 GMT 12 May 83]

CSO: 5100/2063



## NUCLEAR PROGRAM REVIEWED; ISLAMIC WORLD URGED TO COUNTER IMBALANCE

London ISLAMIC DEFENCE REVIEW Vol 8, No 1, 1983 pp 20-27

[Article by Dr. Khurshid Ahmad Khan]

[Text]

In 1876, Jamsetji Tata, the founder of one of India's largest concerns set the following priorities for his vision of an industrial India: "Knowledge and knowhow. And once again, knowledge, know-how and experience. In addition, our own iron and steel. Plus our own cheap electricity". In 1944, India's foremost scientist Homi Jehangir Bhabha argued that "an Institute is needed as an embryo from which I hope to build in the course of time a school of physics comparable to the best in the world. When nuclear energy has been successfully applied to power production, in say a couple of decades from now, India will not have to look abroad for its experts, but will find them ready at home". With this in mind, Bhabha persuaded the Tata family to establish India's first basic research center, the Tata Institute for Fundamental Research at Trombay near Bombay and with it started India's march on the nuclear path. In 1947, when India gained independence from British Colonial rule, Tata Institute had already gathered scientists and technicians in the nuclear field. Within a couple of weeks of independence India's leaders called their first meeting to discuss nuclear energy in which Bhabha was invited as an expert. At his advice, Indian Atomic Energy Commission (IAEC) was set up in 1948 with Bhabha as its first chairman. The IAEC was under the direct supervision of the Prime Minister. At the same time India established the Central Government Atomic Energy Secretariat directly responsible to Mr. Nehru, the Prime Minister and Bhabha was appointed as its Secretary in addition to his position as Chairman of IAEC. He was thus given direct access to the head of the government, Prime Minister Nehru. With Bhabha's vision and government's total commitment to his

recommendations as a scientist, India was soon able to train a large number of people and to create a technological base for its nuclear programme. In contrast, Pakistan established its Atomic Energy Commission (PAEC) in 1958, eleven years after independence. The Chairman of PAEC was answerable to a Joint Secretary of the Central Government's Ministry of Industry. The policies and recommendations of PAEC's Chairman were approved or rejected by junior bureaucrats who were scientifically ignorant and without the will to come out of their inherited colonial environment to observe the technical breakthroughs and scientific developments in the world, so vital for the survival of any country in the modern world.

In India, in fact Bhabha was by 1946 heading a provisional Atomic Energy Commission, which in 1953 became a fully empowered member of the Indian Planning Commission, mapping out the course of the nation's future industrialization. In 1955 India had Asia's first nuclear reactor which was built by local scientists and technicians. It was a great achievement since it proved that India had successfully trained a large number of people and was in a position to launch a successful nuclear programme. In 1960, India acquired a 40 megawatt reactor from Canada, alongwith its technology, under Colombo Plan. The reactor was obtained on the pretext that it will be made accessible to the scientists of all countries participating in the Colombo Plan. This, however, proved to be an illusion. India used the plutonium from this reactor, located near Bombay, for its 1974 nuclear explosion. With modern nuclear technology now in India's grasp, the way was clear for the indigenous fabrication of advanced nuclear reactors. At the same time India acquired maps, diagrams, blueprints etc. of a Reprocessing Plant from the United Kingdom. Equipment, engineering and hardware for the plant was purchased in the United Kingdom and the United States where it was then available without any restrictions. The reprocessing plant was thus erected, made operational and by 1964 India had enough plutonium to carry out an atomic explosion.<sup>1</sup> During the Nehru-De Gaulle years, France emerged as another very important partner of India in the development of nuclear technology. Beginning in the early and mid 1960's, France and India collaborated and in 1971, they signed an agreement for fast-breeder reactor technology.

transfer. Development of fast breeder reactors was essential for the development of India's nuclear industrial base, for India's vast reserves of thorium can be efficiently used only with fast breeders that convert thorium into fissile U-233. India's thorium reserves, the world's largest, contained in monazite beach sand as well as some inland deposits are estimated at 363,000 tons. The country's total uranium resources are estimated at about 53,000 tons; additional uranium in the monazite beach sand deposits is estimated at about 13,000 tons. India is already working with France in constructing a 15 megawatt-electric experimental fast breeder slated for operation soon. In January 1980 French President Valery Giscard d'Estaing paid a four-day visit to India. It was the first visit of a French head of state to India. A bilateral package was signed for deeper cooperation in the fields of technology, industry, agriculture, petrochemicals, mining and commerce etc. In a session devoted to talks on cooperation in the nuclear field, Indian Atomic Energy Commission Chairman Homi Sethna was directly involved. It was decided that a high-level Indian team will go to Paris for detailed discussions on fast-breeder reactor development under the existing nuclear accord between the two countries. Giscard spoke highly of the Indo-French cooperation in the fields of applied mathematics, data processing, solid state physics, microelectronics, biophysics and electrical engineering during his visit. It was agreed that the French concern Aluminium Pechiney will set-up a \$1200m bauxite-aluminium industry in Orissa, including a 600-megawatt power plant. (France is already helping India in the development and acquisition of know-how for building high-thrust liquid rockets).

Current energy production in India is about 50 gigawatts. By 2005, its requirement would go up to more than 365 gigawatts, out of which 286 gigawatts will come from nuclear power. A study prepared for a pro-nuclear group involved in Mrs. Gandhi's election campaign in 1980 suggested that India should have 100 nuclear power plants over the next two decades. By the year 2000 it should develop its full 40 gigawatt nuclear potential capacity, add another 40 gigawatts of fossil-based capacity and make-up the balance of a 230 gigawatt goal with 150 gigawatts of new nuclear energy. Of this 150 gigawatts, India would build nearly 50 gigawatts itself, mostly in Indian-designed CANDU-type nuclear reactors. In all 346 nuclear plants would be

required, 190 of them imported. It was suggested that India must immediately launch a programme for its own CANDU design and construction for plants of 1,000 megawatt size quickly, ending its reliance on Canadian CANDU technology. At the same time it was urged that India must begin importing LIQUID METAL FAST BREEDER REACTORS (LMFBR). The current plan is to build-up an inventory of plutonium, a reactor fuel produced in the CANDU reactor, and use it to fuel the LMFBR's. India's CANDU reactors and imported light water reactors will produce plutonium, which will fuel the fast breeder reactors, which in turn will produce U-233 in their thorium blankets and plutonium in their fuel regions. Both of these can be used to fuel more fast breeders, liquid water reactors (LWR's), CANAD's, high temperature gas reactors, or a combination of all of these. The goal of the Indian Atomic Energy Commission is to produce 15 gigawatts from 150 nuclear reactors by the year 2000. India is also planning to export reactors and is developing the capacity and expertise to export 20 of them within the next two decades. The near future import strategy includes the import of 14 light-water reactors, five of which will be floating nuclear plants; six high-temperature gas reactors; and three fast breeders. Before the year 2000, when India can begin building its own, it will import 12 high-temperature gas cooled reactors (HTGR), a reactor which is already a developed system in both the United States and West Germany. During the second decade of a 40 year development programme beginning in 1980, India will import 33 LWR's, 19 of them floating nuclear plants; six high temperature gas reactors and eight fast-breeder reactors. In the next century, the emphasis would mainly be on the import of floating nuclear plants, HTGR's and fast-breeder reactors. Between 1980 and 1990, India will build 10 CANDU reactors produced by Indian-skilled labour in Indian-owned and operated production facilities. From 1995 onwards India will begin construction of its own version of the fast-breeder reactor and HTGR. These designs will be based on the experience gained from the imported plants. By the year 2000, India's domestic production will be 45 CANDU's, seven HTGR's and five fast-breeders. Table I shows the nuclear development programme of India between 1980 and 2010:

# INDIAN-OCCUPIED KASHMIR

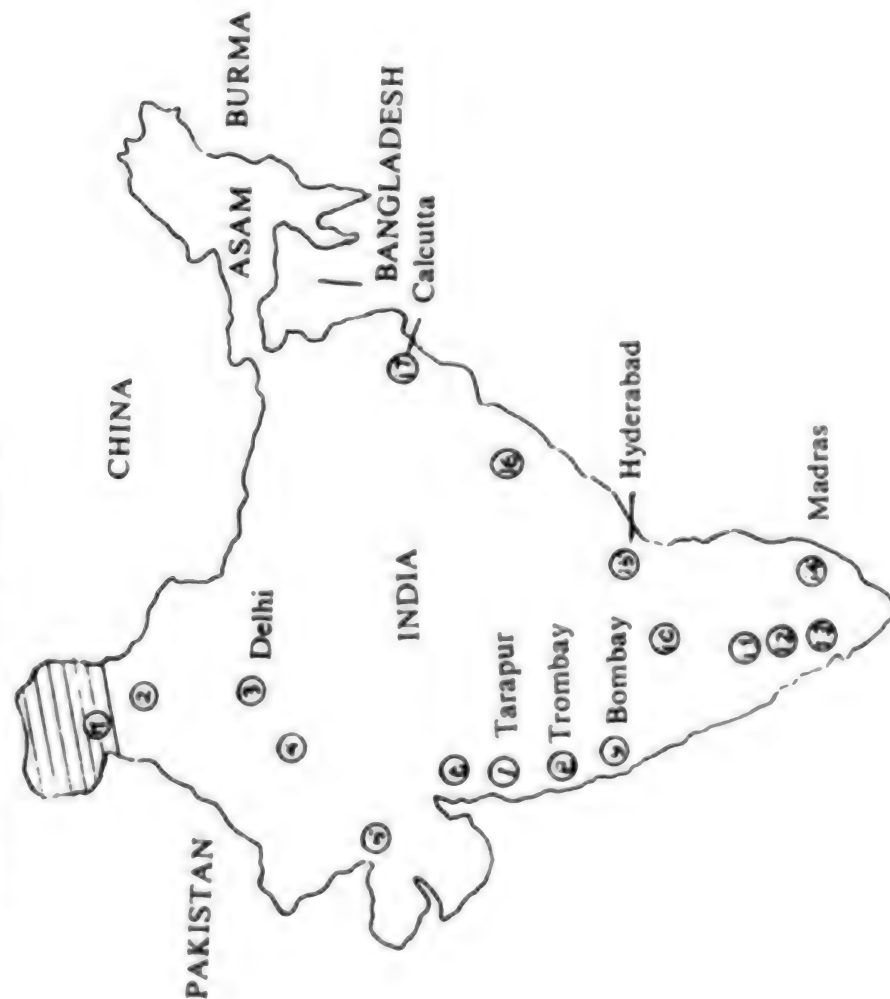


FIGURE 1

## INDIAN NUCLEAR INDUSTRY

1. High altitude research centre
2. Heavy water plant
3. Atomic Minerals Division
4. Nuclear power station, Heavy water plant
5. Physical research laboratory
6. Heavy water plant
7. Power reactor fuel reprocessing unit
8. Nuclear power station, Bhabha Atomic Research Center
9. Tata Institute of Fundamental Research, Tata Memorial Center
10. Seismic Station
11. Rare Earth Elements Plant
12. Mineral sands
13. Heavy water plant
14. Reactor Research Center
15. Electronics Corporation, Nuclear Fuel Complex, Nuclear power station
16. Uranium Corporation
17. Saha Institute of Nuclear Physics, Variable energy cyclotron

**TABLE I**  
**NUCLEAR DEVELOPMENT PROGRAMME**  
**OF INDIA BETWEEN 1980 and 2010**

1980:	Beginning of the expansion of Indian CANDUs construction facilities
1985:	Large scale import and indigenous construction of Indian CANDUs, LWRs, HTGRs and LMFBRS, hydrogen-bomb capacity.
1990:	Delivery of first floating nuclear plant (LWRS). Initiation of India's first LMFBRS and the thorium fuel cycle.
1995:	Completion of the construction of India's first CANDUs for export to developing nations. Start of fuel reprocessing and fuel fabrication on large scale.
2000:	Production of first floating CANDU. Construction of LMFBRS and HTGRs begins on large scale. All of these would be Indian-designed and Indian-built. Use of converted thorium-to-uranium fuel begins in significant quantity.
2005:	Slow phasing-out of imports of LWRs with the rapid expansion of Indian CANDUs and advanced LMFBRS and HTGRs.
2008:	Completion of the construction of first LMFBRS for export to developing nations.
2010:	Fusion-fission hybrid reactor "fuel factories" begin operations accelerating India's conversion of thorium to uranium fuel.

The first fully indigenous nuclear reactor vessel, the CALANDRIA has been designed by Bhabha Atomic Research Center (BARC). The Calandria is the heart of a nuclear reactor built for the R-5 Project at the BARC. It was designed by the Center's Reactor Engineering Division and fabricated by its central workshop. The R-5 is a 100 megawatt thermal research reactor which is almost complete. Many new techniques have gone into the development of the Calandria. One such technique involved the use of partial vacuum electron-beam technology for welding (fuel-cut

plutonium). The Calandaria is made from extra-low carbon stainless steel plates. The main shell is 3750 mm in diameter; the height of the Calandaria is 6700 mm. BARC scientists have also developed mixed oxide fuel of Uranium and Plutonium which can work as an alternative fuel in place of the enriched uranium supplied by the United States for Tarapur Nuclear Power Plant at Tarapur in Maharashtra State of India. The only other operational nuclear power plant at Kota in Rajasthan State utilizes indigenous natural uranium. The nuclear plants at Narora and Kalpakkam will also be pressurized heavy water reactors using indigenous uranium. India's fifth atomic power station to be set up at Kakrapur in Surat District of Gujarat State will have four reactors of 235 MW each. For the present it has been decided to commence construction of two reactors. France has agreed to supply nuclear fuel for the Tarapur plant, replacing United States. This fuel will be supplied on Indian terms, without any safeguards under a very comprehensive programme, and may easily be diverted to manufacture nuclear weapons. The announcement was made on 26 November, 1982, one day before the visit of French President Francois Mitterrand to India, the second visit by a French President to India within a period of less than three years. This signifies the importance attached to India by France. On his visit the French President said in a television interview that significant scientific, technical and military contacts and agreements already exist between France and India. It is appropriate at this point to mention various modes of help India received from the United States. In addition to supplying nuclear technology, hardware, technical assistance and training of Indian scientists in the nuclear field, American scientists took an active part in planning and executing India's nuclear policy. Citing only one of the many examples, Noble Laureate, Dr. Glenn Seaborg, former chairman of the now defunct United States Atomic Energy Commission for ten years and currently at the University of California's Lawrence Livermore Laboratory, Berkeley, and Dr. Rama of the Tata Institute developed a proposal of applying a network of underground nuclear explosions that would create rubber-filled "chimneys" to catch the flood water of the Ganges River during monsoon season. It was estimated that 200 such chimneys are needed to be created by 200 nuclear explosions giving unmatched expertise to India outside the United States and Soviet Union in developing and



manufacturing nuclear weapons suited to all specific needs.

Another example of U.S. - Indian nuclear cooperation is the BARC concept of "NUPLEX", first developed by Bhabha in discussion with the U.S. atomic energy researchers at Oak Ridge National Laboratory, Knoxville, Tennessee. Under this plan a nuclear power complex based on CANDU-type heavy water design of 3,000 megawatts would be built around which the agriculture and industry of a rapidly developing region would be centered. The BARC-NUPLEX Plan has been proposed for two region to be linked by power transmission and distribution system and rail and transportation system. These two regions are the Ganges Plain, in which a nuclear power center would be surrounded by industrial and fertilizer plants; and, the Saurashtra Desert region, which would be a similarly organized agricultural complex.

India needs huge quantities of nuclear fuel to run its expanding nuclear programme. In September 1980, Dr. N. Srinivasan, Director of the nuclear engineering and heavy water projects for the Indian Atomic Energy Commission announced that seven new heavy-water production plants would be built in India by 1986. The seven new plants along with the five plants now in various phases of construction and commissioning would enable India to generate 10,000 megawatts of electricity within the next fifteen years, approximately 12% of its energy needs. The plan is to increase nuclear energy to 78% of India's energy needs by the year 2005. The 10,000 megawatt capacity does not include the separate experimental fast-breeder nuclear reactor programme now underway. In February 1981, Dr. Homi Sethna, Chairman of IAEC disclosed that India has acquired the capability to keep its U.S.-supplied Tarapur atomic power plant running should the U.S. renege on its 1963 agreement to supply the facility with enriched uranium fuel. Dr. Sethna announced that at Tarapur the construction of a nuclear-fuel processing facility has been completed which could be used to extract plutonium from the spent fuel to keep the plant running.



### ***Nuclear Fusion Programme***

In June 1980, Dr. Sethna indicated in an interview to the "Times of India" that aside from a scaling-up of the present plans for conventional nuclear energy, the Indian Atomic Energy Commission had also mandated the formation of two working groups to take steps toward the development of some sort of rudimentary (nuclear) fusion programme in India, specifically including "laser Fusion". Plasma physics research is going on in various universities and institutes in India and it has been agreed that the fusion research programme be concentrated in one location by pulling together researchers in this field. With the end of global fossil fuel reserves in sight, and insignificant advances made in improving the solar and coal energy systems, fusion energy has emerged as the only solution to the rising energy needs of the world. Recent success in the U.S. "magnetic confinement programme" could lead to a prototype fusion power plant by the year 2000. Impressive achievements in the "inertial confinement" and "laser fusion" add weight to this possibility even further. Reinforcing his belief in fusion, Dr. Sethna in an address before the International Conference on Women Engineers and Scientists in Bombay in September 1981 concluded, "fusion energy will be the ultimate solution to man's energy problems". He criticized those in the West who argue that the developing nations should not follow the "mistaken path" of scientific and technological development.

### ***Factors behind India's 1974 Nuclear Explosion***

In May 1974, India carried out its first atomic explosion, underground in Rajasthan, near the border with Pakistan. The stated purpose was to achieve a breakthrough in harnessing nuclear energy for peaceful purposes and this was widely publicized. The purpose, in fact was different. The surrender of Pakistani forces in East Pakistan on 16 December 1971 had given rise to the opinion in the western world that India had emerged as the dominant power in South Asia. However, on the return of Pakistani prisoners of war from India during 1974-1975, it became clear from the press reports that the demoralisation of Pakistan as envisaged by India was not achieved. The entry of Indian army in Dacca had failed in achieving its long-term objectives of hegemony over its neighbours. The assassination of Shaikh Mujibur Rehman

in 1975, failure of Brigadier Musharraf's coup and defeat of Awami League against former Bangladesh President Sattar were extremely significant setbacks. (Shaikh Mujib's daughter, who was granted political assylum in India after his assassination, and whose husband was given employment at Bhabha Atomic Research Center, was sent to Bangladesh prior to the election to head the Awami League). Events in Bangladesh were not anticipated by India and it was considered as a puppet regime until the assassination of Shaikh Mujib. To keep Bangladesh a nation whose survival was totally dependent upon Indian wishes, India was able to extract Shaikh Mujib's signature on a 25 years treaty of friendship and cooperation.

Within a year of the creation of Bangladesh, Pakistan was able to gain much of the lost self-confidence and was able to host the summit of Islamic heads of states and governments in 1974 at Lahore. Something had to be done to enhance India's stature vis-a-vis Pakistan and an atomic explosion was the obvious choice. Its purpose was two-fold. First, to perpetuate the western world's belief that India was in fact the dominant power in South Asia, and, second, to bring it to the realisation of Pakistan that India was far ahead in nuclear technology, offensive capability, industrial infrastructure, and, that, Pakistan had no alternative but to tow India's line. Nevertheless, the overthrow of Shah of Iran and the Soviet aggression in Afghanistan were so serious geo-political developments that they could hardly be ignored. Western attitude towards Pakistan began to change. At the same time the habitual Indian cries of Pakistan arming itself also began to be heard. This was in fact to conceal India's own massive acquisition of arms and increase in its defence expenditure. During 1982-83, \$5600m (17.5 per cent of the Central Government budget) were allocated for the defence, up \$980 from 1981-82 budget. (Incidentally, the amount of recent IMF Loan to India is \$5700m). This constitutes the biggest allocation to the military since India's independence in 1947. It is three times the amount spent in 1972 and 77% more than 1977 defence expenditure. The defence budget allocated is as follows: Army \$3160 million; Air Force \$1190 million; Navy \$436 million; Defence research and production \$380 million; Civil and Military Space programme \$330 million. Production of sophisticated electronic devices, strategic alloys, arms and equipment will be increased. India's only one agreement, to acquire 150 mirage-2000 planes and their technology from France,

## WHAT IS MAGNETO-HYDRODYNAMICS (MHD)

In a conventional steam generator, only about 35% of the energy of the fuel reaches the transmission lines. It is because 65% of the energy is lost in the conversion of fuel to heat, heat energy to mechanical energy, and mechanical energy to electricity. MHD reduces these three stages of power production to one — a continuous process which involves no moving parts. Heat from a burning fuel, (oil or coal) produces a stream of conductive plasma that flows through a long, nozzle-like tube surrounded by electromagnets. The gas stream essentially replaces the armature of a conventional electric generator. The current which is thus created, is drawn off by electrodes along the length of the tube. The energy conversion efficiency is increased by as much as 60% by this process.

MHD conversion may be used with gas, coal, nuclear and fusion power. In a fossil-based MHD system, the ionized gas or plasma conductor is the fuel itself, combusted at high temperature using potassium catalyst. In the nuclear MHD-system, the plasma can be a liquid or gaseous metal coolant heated by the fission process. In fusion MHD, the plasma that is the fusion end-product will be directly converted to electricity. By 1983 a joint American-Soviet MHD power generator, U25B would be in operation and by 1990, they will begin design and construction for baseload coal-burning MHD power plants. Soviet Union is already operating MHD power generators like U-25, to be followed by U-500.

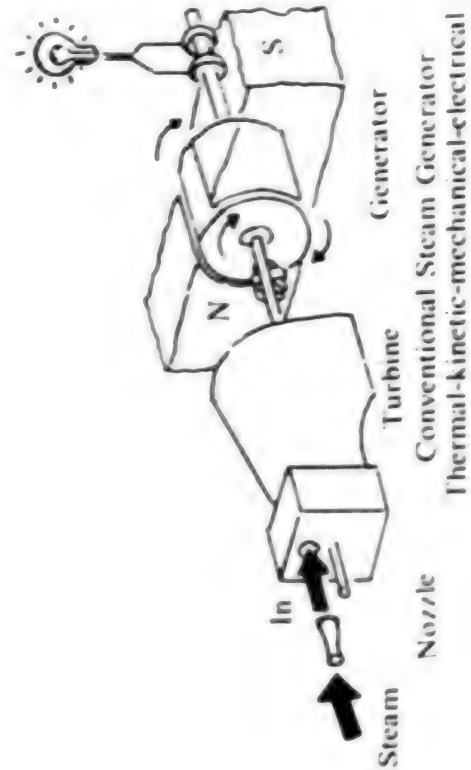
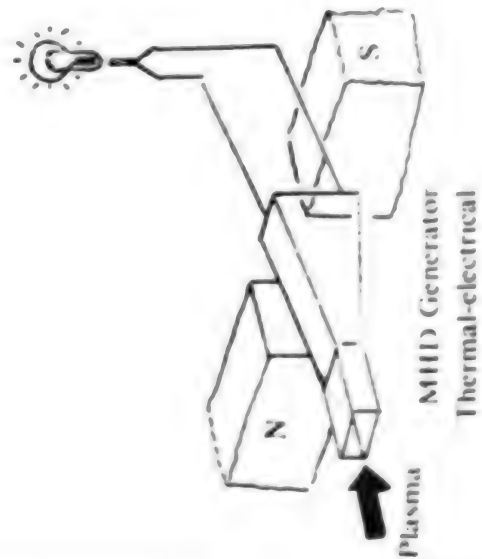
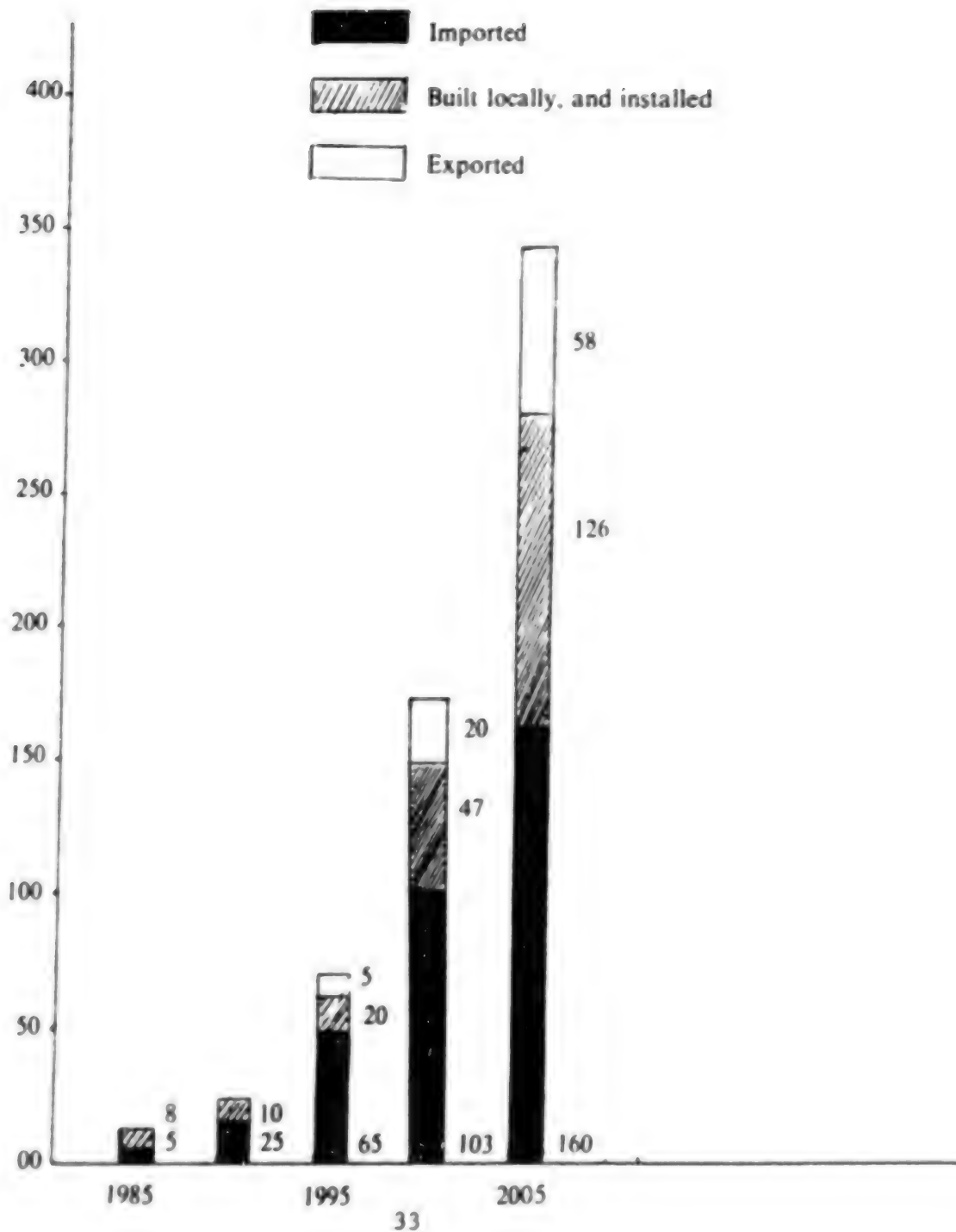


TABLE II

Number of reactors, built, imported and exported  
by India by the year 2005.



confirmed during President Mitterrand's visit to Delhi in November 1982, is worth \$3000m; equal to the entire U.S. military and economic aid package to Pakistan, spread over a period of six years. 110 of the mirages will be manufactured in India and only 40 will be purchased from France. The other Indian arms deals like \$5000m arms from the Soviet Union at an extraordinary concessional price of \$1600m is only one more example of the long list of such agreements.

### ***Magnetohydrodynamics***

Besides nuclear energy, India is exploring other pathways for the generation of energy if its dream of a world industrial gain within the next twenty years has to be realized. Thus, India would be able to challenge the industrial might of the United States, Canada, Western Europe and Japan on one hand, and Soviet Union, China, and Eastern Europe on the other. An important breakthrough is an Indian-manufactured Magnetohydrodynamics (MHD) generator which was successfully tested on 22 May, 1980, in the Soviet Union. It was manufactured at Bhabha Atomic Research Center under the direction of Dr. V.K. Rohtagi, who indicated at that occasion that the generator was independently designed and built by Indian scientists employing indigenous technology. The only other nations with a significant MHD programme are United States and the Soviet Union. With the MHD breakthrough, India would be able to use huge low-grade coal reserves. A pilot plant is now complete and is to be followed by a commercial power plant at Tiruchi in Tamil Nadu State. This pilot plant is similar to the U-25 plant now in operation in the Soviet Union.

### ***Nuclear Programme as an Instrument of Indian Foreign Policy***

By the year 2005, 346 nuclear plants are set to come on line in India; 58 of them built for export to developing countries (TABLE II). Once these nuclear plants are exported, installed and successfully commissioned in developing countries, India would enjoy tremendous leverage on these countries by withholding nuclear fuel, spare parts, maintenance and expertise if the need arises. Consequently, many Third World countries, unable to obtain crude oil due to rocketing prices, and dependent upon nuclear energy for fulfilling major share of their energy requirements, would be forced to shape their foreign policies according to Indian wishes and global or sub-global strategies. By 1995, India would export five nuclear reactors, beginning the

exertion of its will on five nations. Within the next twenty years, the number will grow by 53 more nuclear reactors. With 40-50 countries on its side, India would be in a very strong position to challenge the super-powers on the world scene. It might demand and get a permanent seat at the United Nations.

At the same time it has to be emphasized that India is moving towards West and Western World would offer any inducement to facilitate the Indian move away from the Soviet sphere of influence. The following developments give strength to this notion:

- ★ Mrs. Gandhi visited United States before going to Soviet Union in 1982.
- ★ India did not accept the Soviet offer of a 1000 megawatt reactor made during Mrs. Gandhi's visit to Moscow, in September 1982.
- ★ One of the largest loans (\$5700 million) IMF gave to any country, was given to India in 1982.
- ★ Two French presidents visited India within less than three years.
- ★ Even though the United States refused enriched uranium for Tarapur nuclear power plant, it encouraged France to supply that fuel which was announced in November 1982. The fuel would be supplied without any safeguards, and on Indian terms.
- ★ Due to Indian objections, United States hinted that vital electronics may be removed from F-16 fighters to be given to Pakistan, even though it was agreed that India will have no right of veto over arms purchase by Pakistan.
- ★ Transfer of technology to manufacture 110 Mirage 2000 fighters in India out of a total of 150.

Western world's embrace of India would only be at the expense of Pakistan, which would have to reshape its foreign policy in the light of these developments. Also Indian in-roads in the Islamic world are increasing rapidly. Purchase of 50 Indian tanks by Kuwait army some time ago, huge development projects won by India in various Arab countries point to the success of Indian foreign policy even though it has Israeli Consulates in Bombay, Calcutta and Madras. Developments and breakthroughs in nuclear field, space research and inter-continental ballistic missiles would enhance India's stature even further in this region. In January 1982, Mrs. Gandhi announced, at the

National Science Congress held at Mysore, India, a 50% increase in support for science and technology over the next five years. In March 1982, speaking at the Science Policy Foundation, London, she emphasised the necessity for India to continue its atomic energy, oceanographic and space programmes.

### **Conclusions**

India has made significant achievements in its nuclear programme. At the time of independence in 1947, it had a large number of trained scientists and technicians working at the Tata Atomic Research Center established by Bhabha in 1944. Its first reactor was built by local scientists in 1955 and another reactor was obtained from Canada in 1960. With French help India acquired fast-breeder reactor technology to utilise local thorium reserves. India is now in a position to fabricate and export nuclear reactors to developing countries enabling it to influence their foreign policies. Besides France, India was assisted by the United States, United Kingdom and the Soviet Union in its nuclear programme. Attention is also focussed on nuclear fusion energy by concentrating fusion research at one location. Indian nuclear explosion in 1974 was to impress upon the world opinion and Pakistan that India has emerged as the dominant South Asian power. The western world is now trying to win India over to its side by various inducements and transfer of sensitive technology. This would enable India to challenge the west within the next 15-20 years, a fact totally ignored by the western world. India's immense lead in nuclear technology would also enable it to establish its hegemony over the Islamic world. It is therefore of utmost importance that immediate proper steps be taken by the Islamic world to counter the growing imbalance by re-shaping its foreign policy, giving a much greater say to scientists and technologists in making national policies, both at the short-term and the long-term level, and to acquire indigenous capability in the nuclear and space technologies by embarking on a zealous scientific plan.

*The amount required for an atomic bomb is generally taken to be 6 kg although under certain circumstances 1-2 kg would be enough. A 1 kg fuel rod in a chemical reactor could produce 3-5 kg of plutonium by neutron bombardment.*



## ATOMIC ENERGY DEPARTMENT ANNUAL REPORT RELEASED

Bombay THE TIMES OF INDIA in English 11 Apr 83 pp 1, 9

[Text] NEW DELHI, April 10--WHEN will the Rs. 118-crore Madras atomic power project (unit 1) be commissioned? A third consecutive annual report of the atomic energy department highlights the fact that the plant is all ready to receive heavy water.

The earlier two annual reports had contained an identical statement that "in physical terms, a little over 99 per cent of the work has been completed and the unit is expected to be commissioned in 1982."

The year 1982 came and went but for want of heavy water, the Madras unit continues to be a fullscale model of an atomic power plant. The annual report promises that both the units of the MAPP are expected to be commissioned during the current five-year plan period.

For the second unit, about 89 per cent of the work has been completed. At Narora (U.P.), 68 per cent of the work has been completed. The two units are scheduled to be commissioned during 1986-87 and 1987-88, respectively.

#### Causes of Delays

The report notes that the major factors contributing to delays and slippages in the setting up of nuclear power projects in the past have been the difficulties encountered by indigenous industries in developing advanced technology.

The other factors listed are the failure to achieve stringent quality control standards and meeting time schedules for delivering equipment, besides the difficulty encountered in the import of critical equipment.

According to the report, the fast breeder test reactor at Kalpakkam will be commissioned by 1984. All the major equipment (including reactor research vessels) and component have been received and are being progressively installed.

The new annual report also highlights the fact that the vital heavy water production programme too faces hurdles. The annual report for 1980-81 had



said that the two plants would be operational during 1981. The last annual report said that Kota and Telcher plants would be commissioned during 1982. The latest report says that both are "under commissioning."

The annual report says that of the five heavy water plants, the ones at Nangal, Baroda and Tuticorin are under operation. Telcher and Kota plants are under commissioning.

Realising the need for the production of heavy water on acceptable and economic terms and to meet the rapidly increasing demand for heavy water, action has been initiated for scaling up of the capacity and simplifying the design of plants.

Work has started on the setting up of two new heavy water plants--Thal Vaishet project in Maharashtra (110-tonne capacity per annum) and Manuguru project in AP (185-tonne per annum). Both the projects are expected to be on stream by 1987.

The heavy water plant at Tuticorin, based on ammonia hydrogen exchange process operated at better than 70 per cent recovery efficiency during the month of May last year till the run was interrupted by a power failure. The experience has demonstrated the viability of the process and of the technology adopted at the plant, according to the report.

In the research and deevloping area, the report has some heartening news. A new centre for advanced technology for conducting research in the front line areas of controlled thermal nuclear fusion, lasers, micro-electronics and cryogenics and other related areas is proposed to be set up at Indore.

Work has also been taken up to set up a medium energy heavy iron accelerator at the Tata Institute of Fundamental Research, Bombay.

CSO: J100/7093

## NUCLEAR DEVELOPMENTS DISCUSSED IN LOK SABHA

Madras THE HINDU in English 14 Apr 83 p 6

[Text]

NEW DELHI, April 13

Denying the suggestion in a section of the press that the "Pokharan site" where a nuclear device was exploded remained unprotected, the Prime Minister, Mrs. Indira Gandhi, affirmed in the Lok Sabha today that there was no "residual radioactivity on the surface" of the site.

In a written answer to Mr. N. K. Shejwalkar and Mr. Jai Narayan Rast, the Prime Minister said the Pokharan site was in the "protected area" and that no further protection was "considered necessary".

The members who had drawn the Prime Minister's attention to the press report had asked if it had come to the notice of the Government that the "waves coming out of the site had an adverse effect on the surroundings, particularly human beings, animals and plants".

**Reprocessing spent fuel:** Mr. Shivraj Patil, Minister of State for Science and Technology and Atomic Energy, told Dr. Vasant Kumar Pandit in a written reply that the decision to reprocess the spent fuel from Tarapur reactors would be taken at the appropriate time.

Replying to Mr. M. V. Chandrashekaramurthy, the Minister said recently some suggestions had been made to develop uranium enrichment technology as part of the nuclear fuel technology. The strategy had been worked out keeping in mind the requirement of the nuclear power programme of the country and was under constant review.

**Studies at BARC:** Laboratory scale studies were being carried out at the Bhabha Atomic Research Centre on various uranium enrichment processes.

The existing BARC laboratories were fully equipped to do research in nuclear sciences. However, there were several frontier areas such as controlled thermo-nuclear fusion, lasers and advanced accelerators where it was necessary to initiate research work.

The BARC was unable to house those programmes mainly for want of space and it was, therefore, proposed to set up a centre for advanced technology at Indore, Madhya Pradesh, the Minister said.

**Spares for Tarapur:** Spare parts for the Tarapur Atomic Power Station (TAPS) near Bombay are indigenously manufactured since they are not readily available. —UNI, PTI.

## REPROCESSED PLUTONIUM INTENDED FOR USE IN REACTORS

Kuala Lumpur BUSINESS TIMES in English 6 Apr 83 p 17

[Article by Prakash Chandra in New Delhi]

[Text] IS INDIA capable of manufacturing a nuclear bomb which can be used on a warhead? This is an annual question being asked by the international scientific community. India's diplomats and scientists, faithfully hewing to the official line, have invariably given the same response: New Delhi has no plans nor intentions to produce a nuclear weapon.

As one top-ranked government scientist elaborated it, "It is not easy to make weapon-grade plutonium fuel. Whatever we need to reprocess is really designed for our fast-breeder reactors which will use the reprocessed material."

But the controversial question persists. Stirring it up this year is an American government official who was quoted by the Press as saying: "There is simply no reason connected to their civilian nuclear programmes why any of these countries — India, Pakistan, Argentina and Brazil — need to begin stockpiling separated plutonium in this decade. It makes no sense in any atomic power context."

**Bombs**

Such a declaration was followed up by the observation of other scientists that the Tarapore facility near India's Trombay nuclear reactor is designed to reprocess 100 tons of spent fuel annually. Op-

erated at full capacity, the plant can turn up 150 kilograms of plutonium annually. Six to eight kilograms are required to fashion a nuclear weapon.

American nuclear analysts have also been reported as claiming that India is way ahead of Pakistan, China and Brazil in the maintenance of sizeable reprocessing facilities.

Another high-ranking Indian scientist who asked not to be identified told *Depthnews Science*: "We have all the experience we need to reprocess the plutonium fuel. But it is a different story that such reprocessed material can be used for making bombs."

He referred to the nuclear device exploded in May 1974 at Pokhran in Rajasthan state. The reprocessed plutonium used in the bomb, a laboratory scale one, came from the small Canada-India reactor at Trombay.

The scientist stressed that India has no plans of carrying out further experiments after the Rajasthan test although a chain of trials are on the pipeline to determine other peaceful uses of nuclear energy such as in digging canals and mine blasting.

New Delhi political analysts also point out that the Rajasthan test explosion "shocked" public

opinion the world over that further nuclear testing was completely ruled out by the Janata Party when it was in power.

They add that in agreements signed by India with the Soviet Union in 1977 on peaceful uses of nuclear power, more than enough safeguards have been worked in the treaty both at the behest of Indian and Russian negotiators.

Indian nuclear scientists in New Delhi and Bombay are vehement in refuting claims of American counterparts that India has stored enough weapon-grade plutonium to make 20 atomic bombs.

**Confident**

Such a vehemence is in spite of admission that the country is reprocessing spent nuclear fuel at its Tarapore plant and that the effort is being carried out on a commercial scale.

India is now ranked seventh among countries undertaking reprocessing of spent fuel from nuclear reactors. The others are the Soviet Union, France, the United Kingdom, West Germany, Japan and Belgium.

The decision to go into commercial reprocessing is explained by the scientists as due to spent fuel still possessing enough energy which can be used in India's next generation of fast-breeder reactors.

A pilot plant is being

built at Kalpakkam, near Madras, South India, with French assistance. Once this plant has been completed, Indian scientists are hoping to set up a chain of similar power stations all over the country.

They are confident that the fast-breeder reactors are the power stations of the future. They would cost much less to build and will produce more power than the fuel they use. And what is more important, the fuel is already there in the shape of the reprocessed plutonium.

Members of the Nuclear Suppliers' Club are known to be deeply distressed at India's capacity to reprocess plutonium. New Delhi has not signed the nuclear non-proliferation treaty.

In the eyes of the Nuclear Club, India is just an outlaw which has stepped the limits of a Third World country. The club has prepared a list of some 150 items which cannot be sold to India by any nuclear country, including Canada, Britain, France, West Germany etc. But the list has not bothered Indian scientists. Local industry is trying to fabricate the heart of nuclear reactor called Calandria and other essential components.

There has also been growing diplomatic pressure on the Indian government to sign the nuclear non-proliferation treaty.

## BRIEFS

SUBMARINE REACTOR GO AHEAD--New Delhi, May 11 (AFP)--The Indian Government has given the go ahead for the development of nuclear propulsion for submarines, which will be readied by 1991, a published report said today quoting an unidentified parliamentary source. HINDUSTAN TIMES newspaper said it obtained the information from an opposition deputy which requested the paper not to disclose his name. The paper said that the 40 mw reactor will be produced by the Bhabha Atomic Research Centre, India's main nuclear centre situated near the western coastal metropolis of Bombay. The paper said that a special team set up in 1977 had finalised design and other details and a prototype will be ready for sea trial by 1991. No official comment was immediately available on the report. [Text] [BK11C548 Hong Kong AFP in English 0535 GMT 11 May 83]

SOVIET PROPOSAL ON TESTING--India welcomes the Soviet proposal to proclaim a moratorium on all nuclear explosions including those for peaceful purposes jointly with all nuclear powers and a subsequent ban on test explosions. This was stated by the minister of state for defense, Mr K. P. Singh Deo, in Calcutta today. Speaking to newsmen, he said India has always stood for nuclear disarmament and for use of nuclear energy for peaceful purposes. [Text] [Delhi General Overseas Service in English 1330 GMT 11 May 83]

TARAPUR PLANT TERMED SAFE--The chairman of the Atomic Energy Commission, Dr H.n. Sethna, has said all safety measures for protection from radiation are taken at the Tarapur atomic power project near Bombay. Addressing a press conference in Bombay today, he referred to reports in a section of the press about the alleged increase in radiation level of the plant endangering human life and polluting the environment and said all rules and regulations laid down by the International Commission on Radiological Protection are strictly observed and implemented at Tarapur. The level of radiation of the plant is far below the permissible minimum and is not harmful to human health. Dr Sethna said during the last 13 years of the Tarapur plant, not a single employee has been affected by radiation. A press note issued by the Department of Energy in New Delhi today also stated that the safety record of the Tarapur unit is as good as any other similar installation elsewhere in the world. The press note pointed out that reports in a section of the press about the alleged radiation leakage at the power station create an (?erroneous) impression and baseless fear. [Text] [Delhi Domestic Service in English 1530 GMT 11 May 83]

## COLUMNIST EXAMINES HELLSTROM'S DEFENSE OF NUCLEAR POWER

Cape Town THE CAPE TIMES in English 25 Apr 83 p 7

["Science Focus" by Bob Molloy: "Koeberg: Western Cape Masada?"]

[Text]

THE KOEBERG nuclear power station hit the news last week in a two-part series of newspaper articles by Escom's regional manager for the Western Cape, Mr G F Hellstrom.

Mr Hellstrom's piece of special pleading on the need and desirability of nuclear power in general and Koeberg in particular was unfortunately timed. On the day he publicized his view of nuclear waste disposal as "technically one of the easier problems to solve", the United States Supreme Court banned the construction of all future nuclear power stations on the grounds that there is no safe method for waste disposal.

This poses the question: If a technologically-advanced nation such as the US can't solve the problem, what chance has Escom?

Working on the assumption that where there are droppings there has to be a horse, this column took another look at the Hellstrom chronicle. The main points were:

**Coal**

● South Africa has only enough coal to last into the next century

Another unfortunately-timed statement. Science, the CSIR journal, has just reported that the Republic mines 127 607-million tons annually from total estimated reserves of 60 000-million tons. This means that on present consumption, including the annual export of more than 29-million tons, we have enough coal to last for 469 years.

Even if we doubled our consumption overnight, the Republic would still have more than 200 years' supply — without making a single cent into the search for further supplies which are most certainly available.

**Radiation**

● How much radiation can we take safely?

Mr Hellstrom says the radioactivity level at Paarl Rock is 40 times higher than that at the boundary of Koeberg. By implication, people are living there quite safely.

The fact is that people breathe air, not granite. Koeberg, by Escom's own admission, will emit radioactive particles into the air. Paarl Rock emits rays which can be nullified by a few feet of distance or by ordinary clothing. Free-floating particles could enter hu-

man lungs and lodge in human tissue.

The argument is that radioactive emissions will be dissipated in large volumes of air. The nub of the matter is that the smallest source or particle of radioactivity remains radioactive no matter how much the major carrier is diluted. It needs only one of these to lodge in the human lung to cause tissue damage.

When the victim dies of lung cancer 20 or 30 years later in some other city or some other country, Escom can hold up clean hands to the world and cry "No contest".

As any medical authority will tell you, there is no safe level of radioactivity.

**Cost**

Distance from the pith-head, loss of power in transmission lines and cost of transporting 15 trainloads of coal a day to a coal-fired station are all cited as major factors in the choice of nuclear power as the most economic option in the Western Cape.

Nobody thought to point out that it would be our trains, our coal, our jobs that would be created in an area tradition-

ally regarded as industrially depressed. The money would go into our pockets. At the moment it is pouring into very grateful French pockets.

As for the length of transmission lines, it was an astute Israeli politician who warned the Egyptians it was just as far from Tel Aviv to Cairo as it was from Cairo to Tel Aviv.

Whether Koeberg generates electricity by nuclear, coal, solar, hydro means or plain magic, it will still be connected by long transmission lines to the national grid.

It was also hinted that we could be at a strategic disadvantage in leaving ourselves dependent on either long-distance transmission of power or long-distance transport of coal. How much more strategically disadvantageous then to be dependent on long-distance French goodwill for nuclear fuel supplies?

If they won't even play rugby with us, are they more likely to give us nuclear fuel?

Koeberg has been described as a disaster waiting to happen. Given its planning history of misinformed decisions, one of which was the decision to plonk it next to Cape Town, it seems fast heading that way.

The suspicion is that it is, already an economic disaster. To kill this canard, perhaps Escom would release the detailed costs of the venture — not forgetting what we paid for the site and what we will pay in future to keep it sealed

off forever after close-down, plus contingency money and insurance and security and all the other little bits and pieces that may have been fobbed off into other budgets elsewhere.

## Future

Almost a decade ago, in May 1974, in a Cape Times article on Koeberg, I wrote:

"No responsible citizen, no parents watching their child's first stumbling steps, no professional man or woman, nor engineer or scientist, and certainly no representative of the people should take a decision either for or against the use of atomic power until he or she has personally sought out the facts."

What happened is past history. Bicycle-shed politics saw to that. (Everybody knows how to build a bicycle shed and will stand up to criticize each aspect of construction. More complicated and costly ventures, such as a nuke station, are rubberstamped).

What of the future? A genuine fear expressed by the anti-nuclear faction is that Koeberg may well become a Roman Masada, a victory which achieved "... a sterile rock in a waterless desert beside a poisoned sea".

Far-fetched? I wish it were. I wish Mr Hellstrom's article had been more factual and less factual.

I wish the damn thing had never happened.



## NAMAQUALAND AREA CHOSEN AS NUCLEAR 'DUMP' GROUND

### Site Selection Criteria

Johannesburg THE STAR in English 28 Apr 83 p 12

[Article by J. Manuel Correia]

[Text] What were the criteria used by the Nuclear Development Corporation in the selection of a site for the storage of nuclear wastes?

The answers were given at a lecture in Johannesburg yesterday by the manager of the geology department of the corporation, Dr P D Toens.

Dr Toens pointed out that radioactive fission products undergo a complicated decay process.

They decay at different rates, with more rapid decay meaning more radiation or high radioactivity.

Eventually they all become non-radioactive—some in minutes, some in a few days, some in a few years, and a few over thousands of years.

These wastes have to be isolated from the environment until they decay to levels and concentrations that will pose no further threat to the biosphere.

In the case of low-level waste this is in the order of several hundreds of years and several thousand years in the case of high-level waste. The storage of low-level waste, if buried under proper conditions, is completely safe and presents fewer problems than the disposal of many other forms of waste.

The storage of high-level wastes is the subject of much emotional debate.

It should be noted that at a plant like Koeberg about 2 000 drums of low-level waste, which may be safely manhandled and stored above ground, are produced annually.

The site eventually purchased after careful screening is situated in Namaqualand, on the farms Vaalputs and Bokputs, and is about 10 000 ha in extent.



A safety evaluation in accordance with accepted international norms is currently in progress.

"In the foreseeable future only intermediate to low-level waste will have to be accepted and therefore current investigations are not being directed primarily towards the acceptance of high-level waste.

"Such investigations are only due to commence in 1988," said Dr Toen.

Apart from the geological parameters the selection criteria which were needed to cover the safety requirements of both waste forms included rainfall and groundwater recharge, seismic hazard probability, mineral mineral potential, agricultural production, population density, corrosion by groundwater, ecologically sensitive areas, surface and groundwater hydrology, growth potential and political boundaries.

The nearest population centres within a 100 km radius of Vaalputs are Nababeep, Concordia, Okjep, Springbok, Kamieskroon, Garies and Kliprand, none of which exceed 8 500 people.

The estimated population within this radius is about 15 000 people, concentrated in these towns.

Geological investigations indicates that there are no mineral deposits of economic value within a radius of 25 km of Vaalputs.

The only agricultural activity within that same radius is sheep farming, which is declining.

Vaalputs is sparsely vegetated and the paucity of vegetation and livestock limits the possible pathways of radioactivity to man via borehole water which is used only for drinking purposes.

Most of the site is covered by surficial sedimentary and in situ derived material to a depth of between five and 35 m.

#### Trenches

From pitting, drilling and seismic evidence this material would be readily rippable for the construction of the required trenches for low and intermediate level waste burial.

Several deposits of impure kaolinite and non-diamondiferous kimberlite are known in the districts, and these could be used as capping and sealing material for the trenches.

Underlying the surficial rocks are the Norabees granites and basement granite gneisses extending to an unknown depth. Indications at this stage are that these basement rocks are suitable for the emplacement of high-level wastes at depth.

Although some faults exist in the area they are in places at least one to two kilometres apart and hence several suitable sites exist which were devoid of major faults.

Extensive airborne and ground geophysical surveys have been carried out.

A detailed drilling programme was carried out to test the validity of the geophysical and other investigations. The programme is still in progress.

#### Nuclear Expert Comments

Johannesburg THE STAR in English 27 Apr 83 p 3

[Article by J. Manuel Correia]

[Text]

The Namaqualand site chosen for the disposal of nuclear wastes was one of the most suitable that could have been selected for this purpose anywhere in the world, the manager of the geology department of the Nuclear Development Corporation, Dr P D Toens, said in Johannesburg yesterday.

At a lecture organised by the Associated Scientific and Technical Societies of South Africa, Dr Toens said in reply to questions that low-level wastes in drums would be conveyed to the site by road. Asked if this were not dangerous, he replied: "No more dangerous than a petrol tanker."

Asked for his views on nuclear power in countries subjected to terrorist activity, Dr Toens said this was not his field but pointed out that "nothing is invulnerable. However, to blow up a reactor to cause a dangerous situation would be a sophisticated operation."

He said Koeberg had been so well constructed that even if a jetliner crashed into it the station would not be damaged to the extent of presenting a dan-

ger to the environment and human life.

He said that the NDC would actually be helping in rehabilitating the area ecologically because only one sq km of the site would be used.

"Taking due cognisance of the remoteness of the area, its low population density and aridity and the extremely favourable geological and seismic conditions, there can be little doubt that the site acquired represents one of the most suitable localities that could possibly be selected for the disposal of radioactive waste anywhere in the world," he said.

Nucor would as a matter of policy leave no stone unturned in the pursuance of its duty to ensure the safe storage of nuclear waste.

"The attacks on nuclear energy can do mankind no good. When the energy shortage becomes real it will be the poor people of the world who will suffer most."

And those who have delayed the development of additional energy sources will have much to answer for in their misdirected efforts, Dr Toens said.

Koeberg used seawater as a coolant, an advantage in drought conditions, he said.

## BRIEFS

**URANIUM RECOVERY UNLIKELY**--There is little likelihood of a substantial further recovery of uranium spot prices in the near term, Mr Jim Vaughan, vice-president of Nuexco, told the conference yesterday. "Two basic reasons argue against significantly higher near-term prices. First is the continued existence of a strong-secondary market, where holders of inventory are selling material back into the market. Second is the chronic imbalance between consumption and production, which will result in the world's inventory position increasing further over the next five years." Nuexco expects continued growth of installed nuclear capacity into the 1990s, from 146 gigawatts in 1982 to 370 gigawatts in 1996, a compound increase of about seven percent a year. Consumption of uranium (mainly in nuclear plants) on a worldwide basis is forecast by Nuexco to increased from 29 million kg to 58 million kg in 1996, a compound growth rate of five percent a year. Mr Vaughan said that with inventory redistribution likely to continue it was difficult to see a mechanism for substantial price strengthening in the near term. [Text] [Johannesburg THE STAR in English 22 Apr 83 p 11]

**CONSTRUCTION DISPUTE**--Two construction giants, both involved in building South Africa's first nuclear power plant, tackled each other in the Rand Supreme Court this week in a dispute involving more than R12,5-million. M and R Projects, which is a joint venture between Murray and Roberts Mechanicals (Pty) Ltd and Murray and Roberts Limited is claiming R12 565 857 in an application for discovery from Koeberg Civil Contractors, a joint venture between the French-incorporated company Stie Batignolles Société Anonyme, Ltd and Murray and Roberts Holdings Ltd. M & R Projects claimed in papers before Mr Acting Justice P Cilliers that Koeberg Civil Contractors had misrepresented, or concealed, certain terms and specifications in a sub-contract signed between the two companies for work required to be done at the Koeberg nuclear power station. The judge ordered M and R Projects to serve its discovery affidavit not later than May 31. Prior to the signing, both companies had negotiations during the course of which Koeberg delivered numerous documents to M and R which contained the terms of the proposed sub-contract. On December 18 and 19, a Mr Moodie produced a written sub-contract to a Mr Cooper of M and R Projects at the power station site to initial. This was done. By doing this, Mr Moodie expressly, or impliedly, represented to Mr Cooper that the terms and specifications did not differ from those agreed upon. [Text] [Johannesburg THE CITIZEN in English 21 Apr 83 p 3]

RESEARCH MINISTER ON FAST BREEDER, HIGH-TEMPERATURE REACTORS

Hamburg DER SPIEGEL in German 2 May 83 pp 106-116

[Interview with Research Minister Heinz Riesenhuber by editors Winfried Didzoleit and Werner Meyer-Larsen: "Today I Might Well Hesitate"]

[Text] Research Minister Heinz Riesenhuber on technology promotion and the inherited problem of the fast breeder. Heinz Riesenhuber is a chemist by education and a company manager from Hesse, 47, and has been federal minister for research and technology--the sixth one since 1970--since October 1982. As the energy expert of the CDU/CSU [Christian Democratic Union--Christian Social Union] fraction in the German lower house, he made himself noticed from the very beginning by a moderate course in atomic policy. In spite of personal doubts about large-scale technical projects, such as the fast breeder (SNU 300) in Kalkar and the HTR 300 in Schmehausen, Riesenhuber now pushed through the final financing of both disputer reactor types at the same time.

DER SPIEGEL: Mr Minister, you have decided to finish both the fast breeder and the HTR with a tremendous expenditure of public funds. Are we going to have to address you as Mr Atomic Minister in the future?

Riesenhuber: No. Reactor financing does of course tie up considerable public funds but its share out of the budget of the research minister always remains below 10 percent. For the average of the years 1984-1986, it drops to about 6 percent and continues to decline.

DER SPIEGEL: You figured that out real nice for yourself. But your budget does contain massive personnel and administrative costs, expenditures for colleges and the promotion of education. The expenditure for research and project promotion takes up as much as half of your money. How large is the share of nuclear technology?

Riesenhuber: In addition to the reactors, we spend about DM2 billion on direct project promotion. In 1984, we will pay an estimated 600-700 million for both advanced reactors. In 1985 the figure will be about 500 million. But I certainly grant you that breeder construction is the biggest individual item in

the sector in which we cooperate with industry. But that has always been the case in the past.

DER SPIEGEL: Do you feel that this is an inherited problem or is it in keeping with your innermost conviction that one must further promote this expensive technology now to the same degree?

Riesenhuber: I am a part of a continuum here and must start with what I find. In an ideal world, I would much rather have imagined all this as projects carried out within the old time and cost plans.

DER SPIEGEL: Would you have pursued these projects also on your own?

Riesenhuber: At a time when they were decided, I would without any restriction have made just the same decision. At that time I considered both the projects completely correct.

DER SPIEGEL: And what about today?

Riesenhuber: If I had to decide today on the basis of all the knowledge I have acquired in the meantime, I would probably hesitate. But this is a purely philosophical question.

DER SPIEGEL: This is also a material question. Originally, one of these reactor lines, the fast breeder, was supposed to cost DM500 million. Now the costs are around 6.5 billion. You are probably proud of the fact that you have managed to finance this gigantic sum of money. What makes you sure that the proposed sum will now suddenly remain steady?

Riesenhuber: I certainly do not feel like the rooster on the brand new manure pile. I managed to bring about a decision in the situation only to the extent that I was able to do so--a decision which, under prevailing circumstances, I considered to be a good one.

DER SPIEGEL: But how are you going to get a handle on the cost after all that has happened before?

Riesenhuber: We now have a good picture of the licensing process and that is something which in the past caused much additional expenditure. We have all of the partial construction licenses for the fast breeder. In the case of the HTR, we expect the first partial operating license shortly. This is a considerably clearer situation than in the past...

DER SPIEGEL: ...and then industry comes in and says: Now we unfortunately need another 10 percent, another 20 percent. So, government--please fork over.

Riesenhuber: You are right. We can administer until we are blue in the face. We can get the whole thing under control only if we turn it into the vital interest of the economy as a whole, if we stick to our costs and time plans. That is also the nucleus of our financing concept which makes cost overruns certainly very painful for industry.

DER SPIEGEL: Industry--such as, for example, VEB [United Electricity and Mining Corporation] boss Rudolf von Bennigsen-Foerder--however says that you are not at all in a hurry with the breeder. Where does the vital interest of the economy lie?

Riesenhuber: I interpret what industry thinks about the project not in the light of what it says in wonderful telexes but on the basis of the amount written on the check.

DER SPIEGEL: And what does the amount on the check say?

Riesenhuber: We have now agreed on a top price for the HTR. They can bill us only up to that price...

DER SPIEGEL: ...And what about the breeder?

Riesenhuber: We set that up in such a manner that those, who will have to influence the cost, will have a proportionally rising share out of the costs connected with the residual expenditure. The last 200 million will be borne by the manufacturers and operators to the extent of 50 percent in each case. In other words, to the extent of 100 percent by industry.

DER SPIEGEL: But the share of industry, as a whole, is not as gigantic as all that. Out of the 6.5 billion for the breeder, it comes to just about 1.8 billion.

Riesenhuber: I cannot undo what was done in the past. With relation to the coverage gap, which was left to us by my social democratic predecessor, industry pays only 56 percent of the cost.

DER SPIEGEL: With relation to the gap, not with relation to the whole thing. That only comes to 28 percent.

Riesenhuber: My predecessors must answer for what industry paid in the past. That was not much. I must start here with what I find. With relation to the shortage of DM2.7 billion, the share of 56 percent, which I am mentioning here, is quite considerable. And as for the burden on our budget, we are almost equal compared to the medium-term finance planning of the old administration in conjunction with minor fluctuations.

DER SPIEGEL: What are you going to do if industry should say that it cannot handle the cost and that it would discontinue the project?

Riesenhuber: The only thing I can say is this: If industry cannot handle this and if it discontinues the effort, it will have to think very carefully what pains it can suffer itself. This does have consequences. For example: The investment allowance is gone.

DER SPIEGEL: Which is also a government subsidy for the project.



Riesenhuber: Correct. But which must be paid back by industry if it stops working on the project and that also includes industry's own million. And this is my point of departure. For me this is the strongest instrument in setting costs under control. I must build on industry's self-interest.

DER SPIEGEL: Mr Riesenhuber, in spite of all of these pretty justifications for industry's interest: The French obviously have the most advanced breeder with their Super-Phenix. For West Germany, Kalkar and Schmehausen are merely prestige objects for whose cost we could now finance the BAfoEG [Federal Law for the Advancement of Education] and a large number of thermal power plants.

Riesenhuber: I only want to say this much on that score: Industry has in the meantime come in with a very big amount. And it is involved because it quite obviously is of the opinion that this is a meaningful thing here in a long-term concept.

DER SPIEGEL: It would be meaningful only if profitable follow-on objects were present. Otherwise it would be much smarter to work together with the French.

Riesenhuber: We do have contracts with France. And it says there that the completion of the breeder in Kalkar is the contribution which we have to make. If this is not done, the contracts are null and void to that extent.

DER SPIEGEL: In other words, contracts that really tie us up, hand and foot.

Riesenhuber: Those are not contracts that tie us up hand and foot; instead, they are contracts among equal partners. The reactor in Kalkar is decisive within a long-term concept which includes the follow-on of the Kalkar breeder, the SNR II. If it is not built, this concept collapses.

DER SPIEGEL: Are you still of the opinion that a follow-on project for the Kalkar breeder should be built in the FRG?

Riesenhuber: Within the existing contracts, I do not want to abandon the possibility of doing that. This means that, within the contract, we do have access to the very highly esteemed French knowhow, specifically, in such a manner that whatever France and we--France with its reactors and we in Kalkar--collect, can be pooled in a suitable form and will be accessible for both partners.

DER SPIEGEL: In other words, before both of them get together, double the cost would first have to be paid out. How come there are two separate ways for one, albeit disputed technology? After all, contracts can be amended if they become too expensive.

Riesenhuber: I see no indications of any readiness on the part of France to do for such a contract without us, here, making our own technical contribution in the form of our own reactor. By the way, it is a very fundamental question whether we are ready to get out of such a technology, especially now that we have a chance to get in.



DER SPIEGEL: We doubt that this is an opportunity to pursue this technology further.

Riesenhuber: We have indeed looked very carefully at that doubt.

DER SPIEGEL: The breeder idea was born because uranium seemed to be getting in short supply and because the additional fuel, that is, plutonium, was supposed to be produced in the nuclear-technology process. These prerequisites obviously changed.

Riesenhuber: It is obvious that today, compared to the situation 10 years ago, uranium reserves are greater and the mining rate for the LWR is being estimated lower. Both of this would thus further shift the range of the uranium reserves into the future.

DER SPIEGEL: That we agree on.

Riesenhuber: I would only like to ask you to consider one thing. If you discussed that situation 4 years ago--and at that time I drafted energy policy for the opposition--then the situation was like this: Everything that only had the slightest shadow of a chance of making us independent of oil was promoted here massively and emphatically and was accepted by everybody as being necessary, urgent, and important.

DER SPIEGEL: The oil share in electric power generation is 5 percent.

Riesenhuber: That is too narrow a viewpoint. There are many possibilities of replacing one energy source with another.

DER SPIEGEL: Sure: If nuclear power in addition to current also generates space heat.

Riesenhuber: The important thing for me here is to sound a strong warning against extrapolating long-term concepts from a momentary energy supply situation or price situation in the case of oil or uranium.

DER SPIEGEL: In other words, shut your eyes, and go on ahead? Regardless of the cost? And the follow-on project for the Kalkar breeder is not even visible as yet in outline. If it were, you would again also have to pay much money for that.

Riesenhuber: The question as to the extent to which we enter the follow-on project with government money is a question on which no decision has been made here. The only thing is this: Without the lessons learned with the finished facilities in Kalkar and Schmehausen, nobody will tackle a possible follow-on project. What industry makes out of that is not the government's business.

DER SPIEGEL: Why must the government render such preliminary performances in the first place? Why does it not allow the market to decide and make industry share fully in the risk? The assistance given upon the birth of the LWR was also very considerable.

Riesenhuber: Well, you know, in an ideal world it would be such that we would not need any government research promotion for industry--but basic research is something else and environmental research is something else again and that is always a matter for the state. But if you here have an in-house capital ceiling in industry which over the past 10 years dropped from 30 down to 20 percent, in other words, one-third, then the risk is extraordinarily great that industry will design its research policy in the form of short, little steps. Because it can no longer afford projects which promise relatively high yields although they may be connected with a big risk.

DER SPIEGEL: That brings tears to our eyes.

Riesenhuber: Well, really now: Industry would then not finance this with in-house capital which can be included in the risk but would, as a matter of tendency, be working with outside capital which, as a responsible business operator, one can include in the risk only to a very limited degree. As a government we thus certainly have the job, as you say, of providing assistance for the development of new technology.

DER SPIEGEL: We are talking here about something which was planned at times when very high growth rates for current consumption were predicted. In the meantime, the forecast has changed considerably. We are always told that breeder technology is inseparably connected with the nuclear system of the future. If you have now decided in favor of the breeder--although this might perhaps bother you--then you have made a decision against the other, perhaps more reasonably priced strategy, the strategy of energy savings.

Riesenhuber: We promote both of them.

DER SPIEGEL: The 4.35-billion program for energy saving is to be stopped by the middle of the year. It looks as if you have thus made a fundamental energy-policy decision in favor of the atomic course.

Riesenhuber: No, my view is that the effect of this 4.35-billion program was very limited, apart from a possible propaganda effect.

DER SPIEGEL: How come? People after all did invest in energy-saving measures.

Riesenhuber: When the program was started up in 1977, oil consumption did not decline. Only when oil prices doubled in 1979-1980 did we save more than 25 percent with light heating oil. Here we essentially promoted heat retention measures and they would have paid off also without subsidies.

DER SPIEGEL: Heat insulation probably however was always only the first step. For example, you can install boilers that are very much more economical. But if you then stop the program so early that the people can no longer go along, then you naturally deprive yourself of the fruits of the program. The second point is that you cannot confine the effect of these measures to just one year but also to the following ones. In other words, you would have to multiply whatever came out here in terms of oil savings.

Riesenhuber: No.

DER SPIEGEL: Yes, indeed.

Riesenhuber: Well, either something is economical and then it is not necessary for the government to come in with subsidies, or it is not lastingly economical and then a government subsidy is not permissible. A government may subsidize only where a technology is available which is not yet economical but which one can help get over the economy threshold by means of a subsidy limited in terms of time.

DER SPIEGEL: So now you are looking at a mammoth technology.

Riesenhuber: No. We need all energy technologies which have a chance of being economical, in other words, also the renewable energy sources, regardless of whether they involve biogas, heat pumps, or wind energy. That is what our requests for the eighth and ninth legislative terms are aimed at.

DER SPIEGEL: But the DM4.35 billion energy program is running out.

Riesenhuber: This program is running out according to the original plans of the former administration. This program did not exactly promote new energy technologies. If we can, we lift new technology over the threshold between individual manufacture and series production. We build up competition, we build up a cost decline, we build up markets. We have the possibility of this technology prevailing on its own if it is promising. The only thing is this: That must have happened at some time. Either we have found a technology here which has successfully recognized and developed its niches in the market. Then it will continue to be able to live there. Or the whole thing fell flat on its face. In both cases however this means an end to subsidies.

DER SPIEGEL: In the case of large-scale technology, this of course takes somewhat longer. And suddenly--as in the case of the breeder--this leads to a situation where the effort can no longer be broken off after a certain point in time--allegedly because of the money already invested. In the end you are then after all once again promoting a very specific energy technology.

Riesenhuber: I would basically like to say this: A reasonable energy policy can only be so designed that it offers the greatest possible degree of opportunity to any kind of energy and, by the way, also every possibility for rational energy use which after all is often done through very intelligent engineers. In other words: A policy which looks as if certain energy forms are permanently being given preference here by virtue of political decisions--such a policy is wrong.

DER SPIEGEL: We would love to read that in a government declaration. Looking at the research minister's budget, we discover far greater expenditures for nuclear technology than for all other energy technologies together.

Riesenhuber: I said earlier that I cannot influence what happened in the past. Looking at what I took over and looking at what I have now found as decision-making foundation, the situation is such that the research minister's budget was heavily loaded down for the next several years.

DER SPIEGEL: Does it not make you nervous that the risks involved in the breeder are being judged quite differently in two different expert reports?

Riesenhuber: Are you talking about the technical risk involved in the reactor?

DER SPIEGEL: Yes.

Riesenhuber: We have two steps in the discussion here. One of them involves the licensing process. Here we have a legally secured, clearly defined situation. This process is clearly assigned to the executive branch--in this case, the state governments--within the system of division of power. The licensing agencies confirm the safety of the plants.

DER SPIEGEL: And what about the second step?

Riesenhuber: The second step in the discussion was the well-known inquiry commission for future nuclear energy policy. Parliament had wanted to know in advance whether very specific types of imaginable trouble cases are given sufficient consideration within the licensing process. Familiar with both studies, the inquiry commission recommended, with a two-thirds majority, that the parliamentary reservation be lifted. Moreover, with the majority of experts and with the votes of deputies from all fractions. I am thus of the opinion that this thing has been really and thoroughly checked out, to the extent that the possibilities of our political-parliamentary system are at all sufficient.

DER SPIEGEL: All of these are highly formal viewpoints.

Riesenhuber: But this is where form and content coincide. We are among the world leaders in the requirements contained in the licensing process.

DER SPIEGEL: Your predecessor, the social democrat Andreas von Buelow, shortly after the end of his term of office said that he would immediately stop both reactor lines. That would still have been cheaper at that time than continuing them, whereby he starts with the assumption that continuation makes no sense. We are of the same view. Continuation would add up to further costs of about DM10 billion and that is far more than any possible benefit would ever yield.

Riesenhuber: I know that Mr von Buelow has gained a new measure of insight. But you cannot tell that by looking at what reached my desk here in terms of decision-making foundations. There are no documents here that recommended the discontinuation of one or the other or both projects. I know of no documents whatsoever in which Mr von Buelow issued instructions to the outfit to prepare such documents. I have tried to nail down those 10 billion that people keep talking about. I cannot find a breakdown for that figure. I cannot see where that figure could come from. Nor can I tell what all is included there.

DER SPIEGEL: Mr von Buelow wrote in DER SPIEGEL what he included in this: The completion and deficit operation of the SNR-300, the development costs for the fuel cycle, and the demanded participation in an SNR-300 successor.

Riesenhuber: So far nobody has asked me for participation in an SNR-300 successor. Now, as for the operating costs: I cannot tell with what kind of interesting concepts Mr von Buelow got into that. My concept is that the operating costs should be covered from the earnings from the electric current.

DER SPIEGEL: That is very daring. Is there a guarantee for that in industry?

Riesenhuber: We have the draft of a risk participation contract here in which industry is very interested. According to its definition, this contract is supposed to cover unforeseen risks. But it should not be so designed that the corresponding amount will be consumed in case of normal reactor operation. This means that the price of the electric current must cover the costs under the conditions of normal reactor operations.

DER SPIEGEL: Then one would after all have to come up with a new market price for electric current--or what?

Riesenhuber: Well, now, I would really like to know what a market price would be for electric current. I am not quite sure whether the field of electric energy represents the classical example of a liberal market economy as a whole. In other words: What happens to be priced here is a question of mixed calculation. The basic concept however is that the earnings from electric current must cover the costs.

DER SPIEGEL: Your predecessors in office are now doubting that. Did you view your immediate predecessor's change of mind however obviously only in a causal relationship with the fact that Mr von Buelow now is in the opposition?

Riesenhuber: In other words, at least we have an interesting agreement in terms of time.

DER SPIEGEL: Perhaps you might have a different opinion after you leave office.

Riesenhuber: Let us wait and see. At any rate, you can compare my opinion before I came to office and after I left office.

DER SPIEGEL: Mr Riesenhuber, we want to thank you for this interview.

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DAILY DISSATISFIED WITH NUCLEAR-WASTE PACT WITH FRANCE

Stockholm DAGENS NYHETER in Swedish 30 Mar 83 p 2

[Editorial by Olle Alsen]

[Text] Three years have passed since the referendum on nuclear power and 4 years since the reactor accident at Harrisburg in the United States. Where do we stand? Where are we going?

A bill has been introduced in Sweden (SOU 1983:9) that openly admits that there is no "totally safe" method for taking care of nuclear waste. This is in direct contradiction to the requirements of the law and to what the Liberal Party government claimed in June 1979 when it sought permits for new reactors to start up.

In the absence of a safe method of handling the waste, the Nuclear Legislation Committee believes we should be satisfied if the companies come up with an "acceptable" method and carry out a "multi-faceted program" of research on future waste handling. But no one knows yet what it is that must be accepted. This is a case of vagueness as a basis for legislation.

Since more and more high-level radioactive waste will be produced for almost 30 years to come, our children and grandchildren will be forced to accept the least objectionable method available for handling almost 7,000 tons of high-level radioactive waste, hundreds of thousands of tons of medium-level waste, and 12 closed reactors that, due to radiation danger, cannot be touched or dismantled for decades or centuries to come. What a monument to the arrogance of the 1970's!

Sweden also has secret agreements, reported to total about 2.5 billion kronor plus the risk of high damage payments, involving the reprocessing, i.e. separation of plutonium and high-level radioactive waste, of just over 1/10 of all Swedish spent nuclear fuel.

If Sweden lives up to the agreement, which Energy Minister Birgitta Dahl unfortunately believes is necessary because of international law, there is a theoretical risk that about 600 kg Swedish plutonium could be used in some form or another to produce nuclear weapons. Although Birgitta Dahl assured us



many times last winter during debates in parliament that the so-called new agreement with the French government and the IAEA (International Atomic Energy Agency) would give us "full oversight" over the fuel processing, close inspection of the agreement reveals that this is not the case. On 8 December a Swedish Embassy official in Paris asked if an old agreement between the IAEA, France, and the EC's Euratom could be used to keep tabs on the Swedish fuel and on 25 January a French official sent an answer by Telex in the affirmative. Of course, but this is not much of a guarantee. If this verbal agreement from late November is all we have to fall back on, why did Birgitta Dahl promise so arrogantly even later to investigate the matter carefully and allow no Swedish fuel to leave the country as long as there was any risk at all of nuclear proliferation?

Lars Nordstrom, head of the Swedish National Nuclear Inspection Agency, estimated that the fuel issue would be settled by 1984 or 1985 without exporting spent fuel. At that time the Clab facility near Oskarshamn would begin storing the spent fuel. The government ignored this. Suddenly it was in a great rush to try out the ship Sigyn, which already had run aground once. Nordstrom then advised the government to take back fuel that already had been exported, without reprocessing it. This is precisely what should be done!

Reprocessing also is an economic folly. A recent study by the People's Campaign against nuclear power showed that according to the Swedish Nuclear Fuel Supply Company's own 35 billion kronor (!) plan for the "final stage of nuclear power," it would cost about twice as much to reprocess nuclear fuel in France and then vitrify, encapsulate, and bury it in Swedish mined repositories, rather than store it directly without removing the plutonium by reprocessing. The figures presented by the People's Campaign eventually were confirmed, with slight differences, by the State Nuclear Fuel Board.

Of course it is possible, as the People's Campaign believes, that direct storage would not, in fact, be much less expensive than reprocessing, as the industry and the Nuclear Fuel Board believe. In this case, the present deposit required for waste treatment, 1.9 ore per kilowatt-hour of nuclear power generated, must be increased several times over and the long-term costs of nuclear power will be even greater.

But if it is true that direct storage would be much less expensive than reprocessing, then it would be profitable to sell the Cogema Agreement to other customers at bargain prices or even simply pay the 2 or 3 billion, without exporting any more fuel for reprocessing! In that way, we could totally eliminate the danger of contributing to plutonium proliferation. We also would avoid having to build extra waste storage facilities for sections of the la Hague plants (!) when they are closed. In that case, we could avoid testing the patience of the Danes and the Sigyn's tendency to run aground.

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